ROGERS PASS ENVIRONMENTAL ASSESSMENT PANEL

PUBLIC MEETINGS

CP RAIL ROGERS PASS DEVELOPMENT PROJECT

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ROGERS PASS ENVIRONMENTAL ASSESSMENT PANEL

In the matter of Public Meetings of the Environmental Assessment Panel on CP Rail's proposed new track development in Rogers Pass.

PANEL MEMBERS:

P.J. Paradine -- Chairman

Dr. W. Ross

Mr. G. Tench

Held in the Sandman Inn, The Petroleum Room, Calgary, Alberta, on Friday, the 10th day of June, 1983, at the hour of 2:00 p.m., Local Time.

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---Upon Commencing at 2:00 p.m.

THE CHAIRMAN (Phil Paradine): Good afternoon, ladies and gentlemen. Welcome to the Roughheed Room.

As you can see, as we travel along with these meetings we are getting a little closer as time goes on.

I am Phil Paradine, for those of you who have not been following the sessions around. I am Chairman of the Environmental Assessment Panel established to consider the environmental and social impacts of C.P. Rail's proposal in Rogers Pass. The other members of the Panel are on my left: Bill Ross and George Tench.

These are the final set of meetings and the intent is to advise the Minister of Environment at these meetings on the way in which the project may proceed in an environmentally sound manner. This is being done in accordance with the terms of reference provided by the Minister, a copy of which is in the preliminary report issued by the Panel last year.

This report of last year that we made did recommend certain works that could be undertaken by C.P. Rail, and the additional information that was requested, the additional information has been provided to the Panel in April of this year and was sent out for public review. We are now at the stage of holding the public meetings and receiving

comments on this proposal. The project has been approved in principle by CTC and our mandate is to determine the way in which this may proceed and minimize the impact on the environment.

Those of you who want a copy of the report, please leave your name at the back of the room.

Procedures, there are copies of the procedures available at the back of the room as well, and if there is any questions, please ask one of the Panel secretariats to assist you.

We are making transcripts of the meetings, so if you are speaking, please identify yourself using the microphone. Those that are making presentations, use the microphones over here; and in addition, we have a microphone on the floor for any questions.

The schedule is that C.P. Rail will be making a presentation on the topic of the day, which concerns the right-of-way, and I believe they have a number of speakers, following which we will be having a number of technical experts who have been hired by the Panel to give their independent appraisal of this particular proposal, and then I think we will be able to open it up to some questions of the various parties.

So, without further to do, I will let Mr. Fox introduce the members of his team and begin his presentation.

(Fox)

MR. JOHN FOX (C.P. Rail): Thank you very much, Mr. Chairman. Ladies and gentlemen, good afternoon.

To conserve time, I am not going to introduce the army I have got with me, but I will say this, that we will have basically four presentations, two of which will be done by Geof Buck on geotechnical aspects of the project and the hydrology and debris flow, and John Krahn will do the analysis of the landslide stability and I will somehow get through the design end of it at the end.

So, without further ado, I would like Mr. Buck to take over. He will be sitting on the far table at station 7 because he has got some slides.

(Buck)

MR. GEOF BUCK (Thurber Consultants): Thank you, Mr. Fox. I am going to present basically a show and tell presentation with slides, describe the geotechnical investigation that was required by C.P. Rail for their assessment and design of earth works, as well as associated structures for their second mainline through Rogers Pass.

The investigation is for the route in the Beaver Valley from Rogers Station to the east part of the main tunnel. I will describe the investigation, but not the conceptual designs other than to give a hint of that utilization.

So, if I could have the first slide, please. Can you see it or can we have another light off?

I might just say that the investigation went from the general to a specific. We started with the geology, surficial geology and bedrock geology through to foundation investigations with drilling equipment and mapping of exposures, both soil and rock and then the assessment of that data and preparation for recommendations.

The physical setting, then, is the Beaver Valley. This is the Beaver Valley looking across at the mountain slopes. The mountains in this area rise to 11,500 feet. In the glaciation, which ended approximately -- the major glaciation,

(Buck)

the valley glaciation, which ended about 9,000 years ago before present, this valley here was filled to an elevation of approximately 9,000 feet, filled with ice. Moraines were deposited on these slopes up to a considerable height. That is dense glacial tills.

As the ice wasted, it allowed secondary deposits, kaine moraines to be deposited on the margins of the ice that occupied the center of the valley. They drape down over the glacial tills. As the valley ice melted and there was then a glacial lake within the valley, material eroded out of these, side tributaries were deposited and there were great depths of sand and silt deposited which is now the Beaver River flood plain.

There was one interesting event specific to this area about 7500 years ago when ice advanced down the Cupola Creek Valley from the higher level, blocked this drainage and formed a glacial lake to approximately this elevation and allowed elevated deltas from the tributary streams to be deposited at Mountain Creek and Surprise Creek and also in the Beaver River near the east portal of the main tunnel.

Subsequent to that, then the ice at Cupola was breached, the valley drained again and then we have the more modern events of primarily material being either washed out of the tributary

(Buck)

streams. These tributary streams then cut down and left elevated terraces again at Alder Creek, Mountain Creek, so that at Mountain Creek, for instance, you have a terrace which is 8400 feet above the existing river. You have a more recent terrace which is maybe 50 below the existing river, and then finally the inside flood plain.

In addition, there are debris cones that have been built up at several of those streams, principally Cedar, Raspberry and Surprise Creeks as a result of debris flows down the valleys.

This is an exposure of the very competent and dense glacial till that is deposited along the route. This is a view of the access road cut.

Here we are looking along the alignment. The aircraft is virtually over the east portal and we are looking down line. The cut in the foreground is made for the Trans Canada Highway construction, and this is the glacial outwash that was deposited in that later glacial lake that I mentioned.

Here we have an elevated terrace adjacent to Alder Creek. The creek has subsequently cut down through this again and left a granular deposit, which will be traversed by construction.

Here is an example of the debris cone. It is not too distinct, but the modern stream

has incised to the deep till slopes and eroded and also through debris depositing a very bouldery material in this area here.

The terrain, then, defined by the geology, was broken into lab forms and in fact the route, and it is approximately ten miles, will cross 39 different land forms. For example, at this location we have the bedrock above the glaciation and then glacial till on these slopes. The fluvial outwash here, which I had showed, and other features along the route. In each of these land forms, the soil has a more or less consistent and distinct soil type.

So with that background, I might mention for the bedrock, the bedrock is a metamorphic material. The grade increases generally to the east along this route and the rocks grade from a low grade mica schist up to massive quartz ite units.

So with that, we then became more specific and addressed the purpose of the investigation, which was the design input, and the design input was to earth works, both the cuts and fills, to define the borrow sources. Well, the borrow, by definition of Parks, must come from the right-of-way cuts and fills. So it is really a question of defining that material which is common borrow, what is usable as filter and what are the sources of rock that would be suitable for rip rap.

(Buck)

Also for drainage, defining the surficial drainage, but more particularly, ground water because on these non-plastic soils stability is very much related to ground water. Earth retaining structures, then. The parameters were obtained for a variety of earth retaining structures and also for bridges, of course the header slopes and footings are up here, foundation options.

For this investigation there was quite a large undertaking and four different drill rigs were used. Becker diesel hammer percussion drill was selected as the main tool because it could penetrate the very course and bouldery soils that are found along the route. Samples were obtained by standard penetration tests and becker density tests were also done for assessing the soil density and the ability to drive piles. An air trac pneumatic percussion rig was used basically to profile bedrock. A mud rotary drill was used where necessary to sample sensitive or fine soils, particularly in the flood plain at the east end of the route.

Test pits were dug to allow full gradation of the soil to be assessed, as well as to be able to measure the insitu density of the soils with a nuclear densometer.

The results of these investigations were compiled in a method which is a new

(Buck)

development, which has been bought and improved and work integrated by C.P. Rail into their design process. This log is a test hole log where in the field information, soils information and the laboratory information is compiled to give a composite picture of the soils at a particular drill hole. This log, the information in the field was compiled on computer input sheets and the data was manipulated by computer and plotted with a pen plotter.

Similarly, this information was then transferred onto the topographic sheets. The soil along the route was then -- we had excellent exposures because to allow the drill rigs to get in, an access road had to be built along right-of-way, so we were able to measure the angle of these slopes, and map the soil types, look for bedding, look for bedrock such as here, identify seepage zones and generally just getting a lot of information.

On the slopes, it is interesting. The till slopes were typically 41, 42 degrees; the back slopes are in the range of 45 through to 60 degrees, and we have had really very little sluffing through this past winter.

The ground water was then investigated. The seepage observations have been obtained here. Water zones noted during drilling as well as the results of piezometer readings were compiled and estimates were made of the permeability and the

(Buck)

hydrologic gradient might be anticipated in the slopes. Ground water is -- I am sorry, I might just mention here that the slope information can then be measured on these temporary slopes, could be compiled slope height versus slope angle to indicate what sort of slopes could be used in the temporary excavations for construction, you know, if they are very high, in the order of 50 to 60 degrees. In other words, below this line which is considered a safe line for temporary work.

Here we have in the hydrology investigation, you notice that there are damp zones where seepage is coming out and drier zones. Some areas are completely dry. The water is perculating straight down into a very permeablesoil. At other locations such as this there are silt stringers in the soil and so the water is tending to day light and has to be considered in design.

The soils were then taken and assessed in the laboratory, simple tests like moisture content, identification, grain size, and this shows a compilation of the major soil types, both the outwash and terrace gravels and the moraines They are both well-graded, non-plastic gravelly-silty sands so they are excellent borrow material, very stable, and they are really very erosion-resistent, which is an important environmental consideration.

(Buck)

The soils, as I mentioned, are strong and the strength is basically governed by the matrix material, so we were able to take the fine gravel through to silt fraction and do laboratory tests, track some laboratory tests, and we find here that the strengths were everywhere greater than 38 degrees in terms of effective angle of friction and they varied from 38 degrees through to 46 degrees, 47 degrees for varying confining pressures with the strength or at least the friction angle increasing with decreasing confining pressures, so dealing with really a very complex material.

Again, we were able to take representative samples and do compaction tests which shows that the density is about 131, I guess, to 140 optimum at moisture contents of about eight percent. This is a fairly critical point because the ability to compact is very closely related to the moisture content of the soil. The soil in the field on an average is found to be one percent below the optimum moisture content or in other words, you can allow the material to gain some moisture and still you can get good compaction, so this material will compact well.

I would like to go on to a description of the bedrock again. As I mention, this is metamorphic rock, and the rock purpose, of course, is to arrive at the safe angle for cut slopes as well

(Buck)

as foundations for bridges and other structures and the ability to retain tie back anchors. The metamorphic rock it is -- there is two aspects to the rock, the fabric or the discontinuities within the rock and the strength or the hardness of the rock itself.

Here we have a quartz ite deposit, a fairly massive material, a strong or at least hard material, and we have the vertical lineaments which are the schistocity or primary cleavage resulting from metamorphism. In addition, of course, these rocks will have joints at the variety of inclinations. So, we systematically went along to all exposures and mapped this fabric data, recording the dip directions, spacing of joints, type of fill and the continuity of these features.

Just very briefly to illustrate how this information can be used, joints in any one direction on this polar stereo-plot will plot in this certain area on the plot here. For instance, if this then is the schistocity and these are cross and down slope joints, they plot in this area and this area, this allows -- and on top of this diagram you then superimpose the orientation of a proposed cut and further, the slope angle of a proposed cut, you can determine whether the joints are likely to cause slippage on a cut slope. This will allow you, then, to either adjust the cut slope

(Buck)

to a flatter angle or to design both in rather permanent support measures.

One important aspect here is toppling. In other words, vertically jointed rock with time will tend to tilt and this is a feature. For instance, here we see vertically jointed rock. I am sure it is not very good, but the joints are now over at this angle. In other words, over the centuries, this upper rock with freezing, thawing, et cetera has gradually moved over, so that the design parameters for this mass of rock which has toppled somewhat will be different from the vertically jointed rock, and this has been taken into account into the design recommendations.

The rock, therefore -- the strength, it varies from massive quartzite, very competent, down to this mica schist which is relatively weak rock and susceptible to weather. That does not mean it is not competent but it may be weaker rock.

So we have investigated a variety of materials, and this information was then compiled and recommendations prepared for construction of retaining walls, such as this reinforced earth wall at the east portal and four bridges, in this case the design parameters for the foundations on sloping approach fills for application to the permanent structures which will replace the structures such as this.

(Krahn)

Thank you.

MR. FOX: Do you want to have questions now?

THE CHAIRMAN: No, I was going to go right on. I just was wondering whether there was a slide presentation for the next person.

MR. FOX: Yes, there is.

THE CHAIRMAN: So we will go back to where we were before.

MR. JOHN KRAHN (EBA Consultants): Panel members, ladies and gentlemen, I am going to be talking about the landslide and stability considerations along the route.

Just a few notes about the presentation. This is a very general presentation. Details of everything that has been done are available in reports. Also, these slides are illustrative. They are not to scale and so they are intended primarily to illustrate features, not to present detail.

There are three slide areas along the route: Griffith, the most well-known of these; the unnamed; and the wet area.

The Griffith and unnamed are beside each other between Mountain and Cedar Creeks, and this slide simply shows the relationship of the slides relative to the existing line and the new line and the Trans Canada Highway.

(Krahn)

The slide masses or the slide areas are very large. The distance from here to here is approximately 45 hundred feet, and there is a substantial difference in elevation from the flood plain up to the top. The unnamed slide is slightly smaller in length and slightly lower in difference from the flood plain up to the top.

The important part about this is the active lobe of the Griffith slide. There is no evidence to indicate that any of this is unstable, but there is some indication that there is a slight amount of movement, and this small area here, which just touches the existing line and the new line will cross the bottom of that.

Geological studies indicate by Thurber Consultants that this Griffith slide is a very old slide. There is some landslide debris with some glacial moraine materials overlying the landslide debris, and it is likely that this landslide probably occurred during and inter-glacial period, indicating that it has been there for an awful long time.

There is also what appears to be some more recent surficial landslide debris and it appears that this surface material here is what is presently moving.

The seepage conditions and ground water conditions are rather well defined by the

(Krahn)

drilling that was done along the new route and some drilling that was done in this area in 1979. There is no well defined water table in the area. There was a little bit of seepage noted in some of these holes, also in these there were some perched water tables but there is no hydrostatic water pressure with depth.

In 1979 there were some slope indicators installed at these locations and there was another one installed at this location last fall. These are instruments which make is possible to measure ground movements with depth and I will be talking about the measurements that have been received from these instruments.

The other thing is that there is quite a bit of water up in this bank over here. There is water in this ditch over here, and some of it infiltrates the existing grade and it exits as surface seepage and causes some near surface movement right up in this area here.

This is a brief summary diagram of the types of movements that have been measured in the Griffith slide area. This green line is for the slope indicator along the existing track immediately below the track grade, and it points out two things: number one, the depth of movement is down to a level of 40 feet, but the majority of movement is very close to the surface. and that is also confirmed by

(Krahn)

what you see in the field and that the tree roots -- trees are uprooted and there is some shoving and pushing very close to the surface.

Above the existing track there has been only about one to two inches of movement over a period of three years, and this is also further evidence of this in that there has been some lifting of the track required over the year, but it has not been a problem.

Then, there has been limited information obtained along the new grade suggesting that there might be some movement, but we need some more data and some more readings on that before we can conclusively confirm that there is movement there.

The new bank that will be constructed over here will improve the stability of potential sub-surfaces like this. Factor of safety is a measure of the degree of stability. The higher the number the more stable the slope, and if we take, for example, a typical slip surface like this without this embankment here we have a factor of safety of 1.17 and with it, 1.25. Another example of this blue line here going from this point to this point, there is also increase in stability. So that this construction here will improve the stability. Those numbers are not large increases, but for a very slow movement such as three inches over a year or

(Krahn)

something like that, these numbers are adequate to stablize that type of movement. There is, of course, this sliding that goes on right on the surface and that can be mitigated or halted by control of surface drainage. The proposal to control the surface drainage is briefly illustrated here.

There are two streams on the edge of the Griffith slide coming into this area, and these will be flumed across this area between the two slides and then down to the flood plain.

I was talking about the seepage in the banks up in the area. Horizontal drains will be installed in there, and that water will be directed into a drainage ditch. Also, this ditch will be lined in order to prevent or decrease, rather, the infiltration and then the near surface movement and the active lobe.

(Krahn)

This will be taken over to a flume and also another stream in here and then flumed down and across the new line as well.

In our reports we have said at one time that this stream over here went on to the unnamed slide. In actual fact, it does not. It comes between the two and it was thought that this was infiltrating the unnamed slide but regardless of where it is this flume will control that infiltration.

Moving on to the unnamed slide, again geological studies by Thurber Consultants indicate that there is some landslide debris here and some glacier material here and that this is quite shallow. The best piece of evidence of the stability of this land slide is that this existing line has been operated here for a long, long time without any difficulty, indicating that things are stable.

There was a slope indicator installed in here last fall and there has been no indication of any movement and no measurement of movement so far. Also the new grade, there will be some fills and there will be some cuts throughout the unnamed slide area or the unnamed slide, but the mass balance in the unnamed will not change. This material will be moved around a little bit but material will not be added to it and material will not be taken away, and since it is

(Krahn)

stable and there will be very little change here, the present stability will not be disturbed.

This one slide as well, I should say, there is no well defined water table in this region. There are some perched water tables but no hydrostatic pressure with depth.

Moving to the wet area slide between Surprise and Stoney Creeks, this slide does not reach the existing line. Only the new line crosses it. It comes up to it.

In this area the biggest problem is the ground water. It is either at the surface or very, very close to the surface. The materials in here, however, are sand and gravel -- good competent material. There is quite a bit of seepage up in this area here, water in the ditch, and that seepage is coming through here infiltrating and arising here as springs.

There are at least four areas where there are springs and these will be collected with flumes and taken across the new grade and by collecting the water, the general ground water levels will decrease in this area, and this will then be taken down to the flood plain.

One of these has already been installed and it was installed last fall and has been carrying substantial amount of water this spring. For final design this one will be upgraded to a slightly better standard but as it

(Krahn)

was installed it required very little right-of-way to install that flume.

During construction it may also be necessary to construct a ditch right at the top of the cut to control some of the surface run-off in this area and if this ditch continues to flow water then it will be taken through a flume across the grade here and then through a culvert and then down a flume down to the flood plain.

I mentioned before that there was considerable water up in here which was in-filtrating through the existing grade and appearing here as springs and that seepage here will also be controlled to some extent by lining the ditch here, taking it over to a stream course, this well-developed stream course over here and taking it down to this point where there is presently some water ponding and also the flume in here has already been constructed; it will also be upgraded during final construction and a short ditch to collect any water and to take it down.

Now the other thing that will be done in this area is to keep these two to one slopes stable. This ditch will be here to collect any surface run-off and it will be directed to the side. There will be some horizontal drains. That will be directed into ditches and then in through culverts and then down on to the flood plain. Also to lower the water table in this area, these

(Krahn)

will be a french-type drain - gravel in here with perforated pipe along the ditch, and this water that is collected in those pipes will be taken through the grade and across here at regular intervals.

Just a general comment about stability of cuts and fills: an extensive computer analysis of stability was carried out and this summarizes the results. Very briefly, it shows that one and a half to one slopes can be constructed up to a height of approximately 80 feet. If they are higher than that, they should be flater than one and a half to one. The other thing is that this graph shows that if we have lower height slopes then we should be able to construct them at a steeper angle. This is not recommended because if they are any steeper than one and a half to one slopes are prone to surface sluffing during periods of heavy precipitation and other factors that control near surface movement. So the steepest recommended slope for the cuts and fills is one and a half to one for heights up to 80 feet, and if they are higher, then they are slightly flatter.

That is my brief summary of the analyses and considerations that were undertaken for the land slide areas.

(Buck)

MR. GEOF BUCK, (Thurber Consultants):

Panel Members, Ladies and Gentlemen: I am going to now describe briefly, I hope, the hydrology and debris flow studies that were done for the 10 major stream crossings for the proposed grade in the Beaver Valley.

The setting is shown here -- it is on the slope of the Selkirk Mountains that the project is located and the peeks rise to 11,500 feet such as Mount Shaunessey shown here, and the weather comes in from the west so this site tends to be in the rain shadow of those very high mountains, but the catchment areas, of course, are up there.

The Beaver River Valley slopes are intercepted at regular intervals by the hanging valleys that I just described previously, and the creeks have middle reaches containing glacial till deposits, and these deep sided valleys such as shown here at Surprise Creek, the stream has incised up above and deposited the debris cone in this area.

There are six such streams on this route. They come from relatively small drainage basins. There are two streams which are from large drainage basins. This is Cupola Creek, and there is also Mountain Creek, and they have the hydraulic characteristics of rivers. There are two streams intermediate between these extreme types

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(Buck)

and they are Alder and Stoney Creek.

So that is the stream setting. The problem, of course, is to size a safe opening for the stream crossings and taking into consideration both the hydraulic capacity and the possibility of debris flows. To set the scene just a bit further, this is just giving you the precipitation data that is available. It is excellent data developed by the Parks in their avalanche control work, and you can see here we have got a relatively small portion of the total precipitation is in rain and often the rain comes in the fall, in say September, and, of course, very high precipitation in the form of snow.

So going to the hydrology study first, the larger streams, that is Mountain Creek and Cupola Creek, there are many streams which are gauged in the area which have comparable sort of drainage areas, and so we can go to stream-flow records and pick out the maximum instanteous run-off for those streams, and you are getting values in the range of four to five meters cubed per second per kilometer squared of drainage area. So for those larger streams we do have available data.

Now I would just note here, interestingly enough, most of these large streams the floods tend to be related to snow melt, but this particular one happened in September,

(Buck)

so obviously you can have rain floods that are the result of rain storms, and these are fairly large streams, let us say in excess of a 100 kilometers squared drainage area. When you get down to the very small stream such as say Cedar Creek, which has a drainage of 1.6 kilometers squared, well it is the rainfall that governs and this data really does not apply to such a small drainage area.

So again just to illustrate that information, we have good information for streams that have drainage area in excess of 100 kilometers squared. In this area, we have got values and they come out at about maybe five or six meters cubed per second per kilometer squared run-off, but our problem then is what do we do for the remaining eight of our ten streams which are in this area here.

Well, without going through all of the details, it was a question of considering the slope of the basins, the size of the basins, arriving at a coefficient run-off and considering the concentration times to prepare an estimate of stream run-off in the smaller basins. The predictions were made on that basis using the rational method of assessment and the values fitted together rather well. In other words, the historical data that was found for the large streams

(Buck)

when extrapolated down following fairly well accepted mathematical relationships wound up with stream values,design floods, which fitted in well with what was arrived at by the rational method. So we now have a design flow, and we can size the openings, except for the fact that some of these streams are suspectible to debris flow.

So first I should describe to you what a debris flow is. A debris flow is a rapid movement of a slurry of soil, rock and wood debris mixed with water down a steep gradient. This is a debris flow on the flanks of Mount McDonald within the pass.

The debris flow events in the area were mapped. This is the project area and these numbers indicate where debris flows were found. They were located first by an air photo interpretation and then by helicopter reconnaissance to determine the nature of the flows that happened in these areas.

So just briefly to reiterate what is required to cause a debris flow, you require a steep channel, a steep gradient to the channel banks that are providing debris such as these as cut banks; the debris accumulates in the valley here over the years and then some event will happen -- it is usually an intense rain storm causing maybe a slip of this bank; that breaks away, and with its momentum carries on down the stream,

(Buck)

accumulating debris as it goes and this material would then arrive and be deposited on the debris cones that I mentioned previously. So an affirmation of the volume of flows, and to a lesser extent, the frequency of the flows. It is estimated that at Stoney Creek the flows may have a frequency of maybe once every ten years, whereas Surprise Creek it may be once in 40 years.

So with these two pieces of information, we can then go to applying this to the design of the openings. I should mention here that all of the these streams are crossed by existing bridges, and so you might ask: well, why do the study? The fact is that several of these bridges and existing lines are high-level crossings where flood flow or debris flow has no consequence. Where at the existing crossing, they are low-level crossings. The low-level crossings are controlled by the geometry of the slope and the requirements of the railroad gradient.

To summarize then, going from Cupola Creek and Mountain Creek, they are mountain rivers where we have bridge spans and guide banks. The piers set down against scour protection. We have the intermediate streams like Alder Creek, Stoney Creek. In the case of Stoney Creek the bridge is well clear of the stream and there is no concern about hydraulic capacity. In the case of Cedar, Raspberry and Surprise Creeks

(Buck)

these are debris flow prone streams and debris resistent structures are proposed there, possibly more from Mr. Fox on Cedar Creek. This is Surprise Creek and this will be placed through a concrete box culvert, which is debris flow resistent. Here we have Stoney Creek, which, as I say, is going to be crossed by a high structure, and finally there is Connaught Creek, which is in a bed rock canyon, and this rather beautiful scene shows the stream. The crossing will be upstream of this and well clear of the stream.

Thank you.

MR. JOHN FOX, (C.P. Rail):

Mr. Chairman, Members of the Panel. My talk this afternoon is entitled "Design Presentation". AS you must appreciate, it is very difficult to summarize a project of this magnitude and complexity in several hours, let alone 20 minutes, particularly when you could understand that we have taken roughly the past six months to design it. However, I will attempt to highlight the 5th Design we are presenting here and give the pertinent details that influenced the final decisions. Further site specific details have been and will be discussed in the presentations by the hydrology, geotechnical, visual impact and reclamation specialists.

(Fox):

The design of the Rogers Pass surface route was a sequential process using all available design techniques and mitigative measures to develop a realistic design that respects the integrity of the existing environment and the highest engineering practice. During the design process, C. P. Rail engineers worked in close collaboration with landscape architects and reclamation specialists on developing optimum environmental and engineering solutions.

Considerations were given to:

1) Maximum horizontal curvature of 6 degrees, Maximum grade of 1 per cent compensated for curvature;

2) Adequate clearance and bridge design at stream crossings which considered both river design discharges and debris torrents.

3) Slope stability, ground water control and soil preparation;

4) Design of cut and fill slopes and retaining structures;

5) Visual impact and overall terrain impact;

6) Completely balancing earth quantities within the park; existing steep slopes, landslide areas;

7) Ground water clearances and frost protection;

8) Coordination of activities

(Fox)

in the construction schedule, and

9) construction of a permanent facility.

Primary consideration was given in design to constructing the railway standards. However, environmental considerations had the most significant influence on the selection of the proposed design and detailed route selection.

Despite the engineering constraints to maintain structural and overall adequacy, the alignment and design were modified to minimize the visual impact. Environmental considerations and impacts generally decided the proposed design and location. Reclamation procedures, balanced earth quantities and schedules to environmentally acceptable standards were developed.

I would now like to present the specific aspects of the surface route design.

Station 0+00 to Station 103+00: I might say that these slides are the same as we have around the room if anybody is interested after, they can take a look at it. This section of the line will be outside Glacier National Park. From Station 0+00 to 70+00 the line will be on a relatively flat terrain and will not be seen from any of the key observation points. The alignment was constrained by the requirement for adequate clearance over Alder Creek.

(Fox)

From Station 70+00 to 103+00, the Beaver River is on the west side of the valley against the base of the slope. The existing mainline has been built into the steep rock terrain just above the river. The proposed alignment had two alternatives:

1) Relocation of Beaver River and placement of large fills in the existing channel, or,

2) Relocation of existing mainline in large rock cuts further into the slope to accommodate the proposed alignment without encroachment into the river.

It was decided that placement of fills into the river would have a much greater environmental impact than relocation of the existing mainline further into the slope. Large rock cuts resulting from the relocation are very visible from the two viewpoints on Heather Hill, but after exhaustive study it was realized that there is little that can reasonably be done to reduce the visual impact at this point.

Station 103 to 141:

In this section, the proposed alignment runs along the base of the mountain slope and then along the margin of the Mountain Creek fan.

The alignment has been designed on fills utilizing material available from the

(Fox)

relocation at station 70 to 100. This reduces the number of visible cuts resulting in a relatively small visual and terrain impact, even though this area is highly visible from the Heather Hill viewpoint.

The alignment was constrained by the requirement for adequate clearance and orientation of the crossing at Mountain Creek.

Station 141 to 176:

In this section, the design was restricted by: keeping the line as far from Mountain Creek campground as possible between station 163 and 176, minimizing the size of fills in the gully between station 163 and 176. The alignment through the Mountain Creek Terrace was considered acceptable because there already is an existing scar and the granular materials have been reclaimed successfully in the trials conducted in 1982 on existing cuts. Top dressing this material as presently proposed will further enhance the reclamation of the new grade cuts. The alignment also permits the construction of a noise berm to preserve the Park experience for campers as well as preventing vehicle access to the track. Upslope retaining walls will be built near station 176 to minimize the extent of the cuts.

Station 176 to 200 - this is the Griffith Slide area:

(Fox)

The proposed line crosses a moderately steep sideslope with relatively shallow soil cover. The alignment was maintained in shallow cuts as dictated by the terrain. Any relocation upslope or downslope would result in either large cuts or large fills which are both unnecessary and undesirable.

Station 200 to 250, and this is also the Griffith and unnamed slides:

The engineering constraints of crossing the slide areas necessitated making use of fills and minimizing cuts wherever possible. Large fills were, therefore, designed on the Griffith and unnamed slides which maintained and improved the stability of these ancient landslides. The large gully between the two slides is abrupt and had to be crossed with large fills. Any attempt to avoid fills across the gully resulted in undesirable cuts through both of the slides. However, this section is less visible than most and the large fills were considered visually and environmentally acceptable.

Station 250 to 263:

Between the unnamed slide and Cedar Creek, the slopes are quite steep and bedrock is close to the surface. The design calls for relatively small cuts in rock since the steep slopes would result in large fills and the loss of considerable

(Fox):

vegetation. The design was severely constrained by the Cedar Creek crossing. Cedar Creek occurs on the crest of a very high and steeply sloping debris cone. Given the geometric constraints, the alignment would have to be relocated a distance of 100 feet away from the mountain side for more than 500 feet on either side of the creek to provide adequate clearance for a crossing on top of the debris cone. This would result in loss of a considerable amount of vegetation with proportionaly large terrain impact. As a result, the design was carried through the debris cone with the planned creek diversion to the west. Due to adverse environmental impact on beaver, and when I say beaver that is not the Beaver River -- those are the little beggars that come in and make a nuisance of themselves, an alternative proposal was presented for training the creek in its present location. Both proposals are shown on the wall panels, and I am not recommending the east channel alignment with the creek channeled in its present location. That is going to be dam costly and that is what we are going to do to save three beavers.

Station 263 to 294 (Raspberry Creek)

Between Cedar Creek and Raspberry Creek, the slopes are steep and bedrock is close to the surface. The major design constraint along this section was the provision of adequate clearance at Raspberry Creek. The design calls for cuts in

(Fox)

rock since large fills on steep slopes would result in loss of considerable vegetation. Most of this section was not very visible and the design concentrated on minimizing the terrain impact. Fill sections were required on the approach to Raspberry Creek to provide the required clearance at the stream crossing. Downslope retaining walls were not feasible due to the attendant stability and construction problems encountered with large downslope retaining walls in steep terrain. Retaining walls are also not necessary since the fills are not visible from observation points.

Station 294 to 332 (Surprise Creek):

Between Raspberry Creek and Surprise Creek,the valley slopes are very steep with bedrock close to the surface. The design was constrained by the requirement for adequate clearance at Surprise Creek will minimizing fill sections on either side of the creek. A siding will extend from Station 317 to Station 412 a short distance east of Stoney Creek. The design minimized the impact by designing cuts in rock with retaining walls, although the additional subgrade width for the siding dictated fairly large rock cuts. Although the design attempted to keep the large fills to an absolute minimum to prevent loss of large amounts of vegetation, the very steep terrain and occasional gullies made it impossible to avoid all fills as the cuts on

(Fox)

alternative alignments became prohibitively large. Construction of downslope retaining walls was evaluated but found to be unfeasible due to the very steep terrain. However, the extent of the cuts will be limited by the design cuts in rock with upslope retaining walls. Downslope retaining walls are again not necessary since the fills will not be visible from observation points.

Station 332 to 384 (Wet Slide area):

The valley slope between Surprise Creek and the wet slide area is very steep, irregular and dissected by numerous gullies and snowslide paths giving the slopes a corrugated appearance. It was found to be impossible to design the alignment totally in cuts or fills due to the depth of the gullies. A balanced cut and fill design was adopted. This results in alternating large cut and large fill sections with the additional subgrade width for the siding. Retaining walls could not be successfully employed due to their required size and the extremely high loads they would have to carry. There was little that could reasonably be done to minimize the terrain impact in this location.

Station 384 to 426 (Stoney Creek):

The alignment crosses shallow slopes of low relief on the wet slide from Station 387 to Station 400. A grade line has been set for a

(Fox)

low fill which, together with extensive drainage of the upper slope and subgrade foundations, give an optimum design for this location. The ancient slide area from station 400 to station 407+00 has been gullied and a balanced cut and fill design has been set.

To reduce the size of cuts and fills beyond the wet slide area, downslope and upslope retaining walls will be constructed between station 408 and 413. Seven hundred feet of bridge structure will be built to replace the east approach fill to Stoney Creek. This costly bridge alternative vastly improves the visual impact and was implemented since this is one of the most visible sections of the proposed alignment.

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(Fox)

Station 426 to 497, the east portal of the short tunnel. At Stoney Creek, the alignment is set to minimize the size of the large cut at Station 429. The terrain between Stoney Creek and the short tunnel is very steep and irregular. A variety of alternatives were considered in this section such as cuts and fills, upslope and downslope retaining structures and an elevated deck structure.

Since the valley slopes are as steep as 1.2 to 1, construction of cuts and fills to slopes of 1.5 to 1 were impossible since fills would extend down to the Trans Canada Highway and the cuts would extend a great distance up the mountain.

An analysis of various types of retaining walls indicated that it was impractical to construct any walls in excess of 30 feet in height, due to the large loads they would have to carry. As well, the existing slopes are stable but have a factor of safety of near unity. Construction of retaining walls along this section would be very difficult due to the limited access. Construction of a 6,000 foot elevated trestle with retaining walls located near Stoney Creek and in the east portal of the short tunnel is considered to be the most suitable design for this area.

Now, having said that, we are still

C-2

(Fox)

looking at that design. That is a mammoth structure to put in place. Whether it be concrete or steel has not been decided yet, but in any event, it might be that a little bit near Stoney Creek may be cut and fill with retaining walls, but certainly something of the order of 4,000 feet plus will be a structure.

Station 556 to 602, and this is the east portal of Rogers Pass main tunnel. The alignment exits the short tunnel at Station 556 and immediately crosses over Connaught Creek. The line from the creek to the portal of the Rogers Pass tunnel will be constructed entirely in fill taken from the tunnelling operations. The majority of the fill will be placed in the existing abandoned gravel pit.

The bridge, if anybody is worrying, is well above those Bear Falls, I believe they are called, and you will not even see the bridge when you are looking at the water dumping over the rocks there.

The earth quantities were calculated by computer and checked manually for verification. The stripping and waste material will be used for top dressing to facilitate reclamation. Contract specifications will specify that the material will be compacted to 95 percent proctor density.

Provisions in the contract will

C-3

(Fox)

require the contractor to handle material in a manner that prevents it from becoming wet. Similarly, construction in unsuitable weather will not be permitted. If material becomes too wet to place due to the contractor's mishandling, provisions will be made in the contract for the contractor to dry it. That ought to stop him.

In the event that wet material cannot be dried on the grade and it is too wet or otherwise unsuitable, it will be wasted. A suitable waste area exists on the upslope slide of the large fill between Stations 224 and 229.

A stockpiling area is proposed in the disturbed portion of the Mountain Creek gravel pit.

Bridge footings and culverts will be constructed during the late summer and early fall after the spring runoff peak and before winter freezeup. Because fish probably spawn in some of the streams in the Beaver Valley during this time period, measures will be employed to minimize the amount of sediment entering water courses during construction.

Coffercams will be placed around bridge footing construction sites to prevent flooding if needed. Water removed from the excavations will be discharged into Mountain, Stoney or Connaught Creeks after being treated in settling ponds or

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(Fox)

with hay bale filters, if necessary.

Smaller creeks will be diverted by sandbag cofferdams well above culvert construction sites so as to keep the sites as dry as possible. Water will be returned to the stream below the construction site. Hay bales will be placed across the stream below the construction site but above the entry point of diverted water to filter sediment out of any water seeping into and through the construction site. Hay bales and accumulated sediment will be removed from the stream bed after culverts and stream training works have been completed. The cofferdams will then be removed from the streams. Hay bales will be used to prevent sediment from entering streams during backfilling operations. Specialized reclamation measures to be used around bridge footings and retaining walls will be discussed in the reclamation presentation.

In summary, then, the alignment that we present to you is the most refined of all the designs and it is our best possible effort to protect the visual integrity of Glacier National Park, while meeting the engineering requirements of a high capacity rail line.

Thank you.

THE CHAIRMAN: I would now like to invite our technical experts to come up, Mr. Hurwitz, I believe, you are probably going to be

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(Adam)

the first one, and Mr. Adam, up here on the right, please, to make your presentation.

MR. LARRY E. HURWITZ (I.D. Systems Ltd.): Mr. Chairman Dr. Adam will read most of it and I will intercede a little later on.

DR. KENNETH M. ADAM (I.D. Systems Ltd.): Panel member, C.P. consultants, and ladies and gentlemen, before I start I would just like to say that I guess that we get paid for being critical and I think our general impression on this project at this stage is that there has been a lot of excellent work done by a lot of consultants and C.P. When we do come to the points of criticism, they should be taken in that context, that there is a lot of good work has gone on.

We are of the opinion that the environmental process to date has progressed satisfactorily. The Rogers Pass Environmental Hearings in the spring of 1982 raised some valid concerns, and C.P. Rail and its consultants have produced some excellent work in response to those concerns in the ensuing months. However, it is evident that Parks Canada and others still have concerns about effectiveness of some of the proposed environmental measures and the ultimate effects of the project on Glacier National Park.

We believe and sense from others, the concern stems mainly from the lack of specificity

C-7

(Adam)

of environmental controls and commitment. This is no condemnation of C.P. Rail. In fact, production of the red book entitled "Rogers Pass Project: Submittal to Federal Environmental Assessment Review Officer, June, 1983" goes a long way towards fulfilling commitments and detailing environmental measures and controls. Most importantly, it demonstrates C.P. Rail's willingness to make such commitments and in itself is testimony to C.P.'s recognition that such a document was needed.

One area of some concern to us is the relative impression of the effectiveness of restoration techniques of major terrain disturbances. For example, C.P. Rail on the one hand cites restoration at the Big Cut at Lake Louise as an example of what can be done, while others cite it as an example of unsuccessful restoration. Again, what is missing is an agreed or specific definition of what constitutes success or failure. A specification such as "restoration shall be deemed successful once 75 percent ground cover is established over 90 percent of the area that can reasonably be expected to be revegetated", would at least bring the problem into qualitative rather quantitative terms.

Another area of concern to us is that either C.P. paints too rosy a picture of the aesthetic qualities of post-construction right-of-way conditions or Park Canada's expectations are

C-8

(Adam)

too high. Probably the true picture is somewhere in between. However, we believe some problems are created by overly optimistic presentations that raise expectations.

As an example, the Visual Impact Assessment Report using the computer graphic photomontage simulation technique is a genuine attempt to aid Parks Canada and others to visualize the terrain impacts and their effects on aesthetics. However, the use of black ink and dark color shades for overlay unintentionally obscures the picture. In summer and for sure in winter with snowcover, denuded cuts and fills will appear in much lighter colours than the surroundings. We have prepared an overlay that accentuates that problem, and you are free to look at that later, if you so desire.

Unless Parks Canada realizes at this time the vividness of the colour contrasts caused by exposed terrain impacts as will be seen from the Trans Canada Highway, they are bound to be disappointed with the end product regardless of C.P. Rail's good efforts to mitigate it.

Other visual realities pertain to car passengers farthest from the new grade, that is, the driver's side in westbound vehicles, and the passenger side on eastbound vehicles. They will focus directly on the new disturbance in many locations.

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(Adam)

This is a result of mountain tops being blocked by the interior roof lines, valley bottoms being blocked by the interior door lines, and the cross-valley view of the Trans Canada Highway being the only side view available.

Environmental inspection is also a concern to us. It is not reasonable to expect on Environmental Coordinator can inspect all construction activities. Crisis type problems alone will occupy the Environmental Coordinator almost full time. Should construction involve two and possibly even three work shifts, one environmental inspector would be run off his feet. Our experience with environmental inspection is that an independent environmental inspector should be available for each concentrated work front, that is, bridge construction, cut and fill, tunnels, et cetera. The Environmental Coordinator should oversee the environmental inspectors and be available for crisis situations.

The right of job shut-down must be available to the Environmental Coordinator if the environmental inspectors are to play a significant role in project control. We do not think C.P. Rail should necessarily be burdened with the cost of such inpsection, but that Parks Canada has responsibility to project the Park.

Training of contractors and their workers about environmental matters and continual

C-10

(Adam)

reminders of the need for environment protection will be required if C.P. Rail commitments to environment protection are to be realized. The soft-sell approach to workers seems to be most effective in our experience, because otherwise workers tend to try to beat the system or to pull one over on inspectors. A sense of team effort to protect the environment where workers control themselves is the preferred method.

Irrespective of environmental inspection and engineering and/or environmental specifications, Murphy's Law will apply. If something can go wrong, it will go wrong. Slides during construction or the need to waste wet materials will almost surely arise. Just as at Lake Louise, unforeseen problems will necessitate requests for deviations from plans and such requests should be anticipated by Parks Canada.

A mechanism to deal with such problems should be left in place by the Panel. We also envision the need for an annual independent inspection of the project. These two needs could be filled by the existing Panel, but we understood FEARO Panels disband after submitting their final report. Therefore, we recommend that the Environmental Committee continue until three years after completion of the project to fulfill a continuing and post construction inspection review.

C-11

(Adam)

Now turning to hydrology. Work on hydrology has progressed significantly in the past year. Design criteria have been established and and site specific recommendations have been made for major creeks to be crossed. Designs have been influenced by both hydraulic and debris flow estimates. In general, flow estimates were found to be conservative for design purposes. Over-design is justified in the terrain encountered, particularly since flow runoff records do not exist for the streams to be crossed. Where records of streamflow do exist for rivers or streams in the region they are either of short duration or for much larger drainage areas. Therefore, we agree with the conversative approach taken. However, on the other hand, over-design will result in extra training works and guide banks that will add to aesthetic costs. There is still a need for further details related to training works and guide banks including aesthetic assessment.

At least two potential problems remain and another problem already exists. They are capacity of temporary bridges; what to do with Cedar Creek; and siltation downstream of existing and future terrain disturbances. The capacity of temporary bridges has been a concern, however, all are now in place, although the one over Mountain Creek was threatened this spring. Because they are

C-12

(Adam)

already in place, there is no reason to replace any that may be under capacity until necessitated by washout if that should occur. To upgrade at this would probably cause as much environmental damage as washout and replacement. Therefore, we recommend no action be taken on temporary bridges except maintenance.

Now, with respect to Cedar Creek, I will probably deviate from my notes and just leave it at this time. I have for the first time seen the proposal at Cedar Creek and I am in general agreement with the recommendation that Mr. Fox made at this time, without having gone into it in detail. I think it is probably the best attempt that could be made at keeping it within or close to its normal channel, and in that respect, I like it much better than the west alternative.

The existing problem that I referred to earlier relates to siltation of streams, stemming largely from the fill material of the temporary access road, and in future from the new railway grade, washing directly into streams. Other such projects such as pipelines and mine development, often just on Crown land, are required to meet certain standards through the use of sediment traps or other means.

Visual monitoring has been proposed by C.P. Rail. However, a more specific standard is

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(Adam)

needed and we suggest the mining standard should apply, that the total suspended solids should be limited to 50 milligrams per litre maximum absolute or ten milligrams per litres above the natural background concentration, whichever is greater.

Natural background concentration should be measured immediately upstream of terrain disturbances for comparison to concentrations within 100 metres downstream of the disturbance.

C.P. Rail is committed to limiting tunnel effluent to 60 parts per million or 10 parts per million above receiving body concentration, whichever is greater. Such effluent flows are normally diluted by stream flows. Therefore, limiting streamflow suspended solids concentrations to 50 milligrams per litre or 10 milligrams per litre above natural background concentration is not unreasonable. This stipulation will require periodic, minimum twice weekly, monitoring, both upstream and downstream and may result in the need for sediment traps, revegetation of temporary fills and the use of natural forest cover for filtering sediment out of drainage flows.

Another concern relates to C.P. Rail's commitment towards slope stablization, temporary bridge removal and reclamation in the event the Crow Rate controversy delays or suspends present construction plans. We believe this possibility must

(Adam)

be addressed by both C.P. Rail and the Panel.

Finally, our last general concern relates to spending dollars committed to environmental enhancement or protection in an efficient manner. As an example, we do not in general find rock cuts offensive and view attempts at their reclamation as inefficient and unnecessary. Therefore, we would eliminate hydroseeding rock cuts as well as the proposed use of dark asphalt tackifier.

MR. HURWITZ: I will continue, Mr. Chairman, with the terrain aspects, and I really have set this up simply to clear up some of the outstanding items related to the 27th of April submission to the Panel after reading the documentation of C.P.'s.

The first item is on the right-of-way. I had requested the area of the right-of-way which would be required and its relationship to the 60 metres or 200 foot width that was approved by the CTC. Now, in the red book, C.P. Rail has indicated a variable width of right-of-way, which is obvious when you look at the plans, which will occupy about 371 acres of park lands, although that total amount will not be cleared.

In trying to put the number in perspective, we have calculated or tried to rationalize the number and have calculated an average width of right-of-way to be 323 feet with about 156 feet

C-15

(Hurwitz)

cleared. This is a number, for the benefit of the Panel and for the benefit of Parks Canada, just to know what they are dealing with. I have had to make certain assumptions to come up with it, and perhaps it seemed the fact the right-of-way was double the cleared width seemed a little difficult to explain, and perhaps C.P. Rail could comment.

We would also ask what alternatives have been considered in location of major cuts and fills which might reduce right-of-way width requirements. C.P. Rail has described the design considerations, which Mr. Fox just went through in considerable detail. Retaining structures were considered in many instances to reduce fill requirements that were deemed unfeasible due to stability and construction problems in the steep terrain, and the high loads for which they would have to be designed.

Now, while these are reasonable statements, it still appeared that certain fills in the section particularly between Station 294 and 284 might be reduced with the use of walls no higher than those that have presently been placed at the east portal of the main tunnel. I acknowledge that there would likely be a cost premium, that it might be possible to save something like 100 feet or more of clearing in certain locations, and possibly C.P. could elaborate somewhat on that.

C-16

(Hurwitz)

The borrow materials item, I noted up here, something I had not seen before was a materials handling charge. Certainly I have a concern about the wasting of wet materials, as I am sure Parks Canada has from the previous experience, and I think C.P. is readily aware of the problem. I would, however, recommend to the Panel that some mechanism which would ensure that Parks Canada have input and/or review of contract documents prior to tender. The grade construction operation must be spelled out carefully and completely in the contract documents so that contractors will know where materials can be disposed of.

In other words, what we are trying to achieve is ask C.P. to spell out where the waste areas will be and no others will be allowed, so that in the heat of the construction program, after it has been raining, the contractor will not want to start taking ad hoc measures to waste the material.

In drainage, again I saw today for the first time plans and so on of the drainage flumes, plus Dr. Krahn's description of the drainage across the Griffith, unnamed and wet landslide areas. I feel I have that well under control. The measures seem very sensible, very satisfactory. Again, it is a disturbance that will occur off right-of-way, and the question I had posed in here is minor but simply to make Parks Canada aware of the situation, as to

C-17

(Hurwitz)

what additional area might be required in terms of the disturbance if it is not already included in the right-of-way figures on page 49.

The hydrology Ken has covered fairly completely. In some of the guide bank requirements for some of the streams, again, it is an off right-of-way disturbance presumably and will require some additional clearing, and could some indication be given of how much that is.

The final concern with the previous letter was the tunnel wastewater treatment. The red book has handled that completely, as far as I am concerned, and we have no further concerns about that.

I would like to reiterate what Ken has said, that things have gone a long, long way from last year and the work has been done in an excellent fashion. Thank you.

THE CHAIRMAN: Thank you very much for the presentation.

Before we stop for coffee break, I will ask our last technical expert, Mr. MacDonald to come up and make his presentation and then maybe we will get you all back up after coffee break. I believe after coffee break also we will be starting with a very short presentation by Parks Canada.

C-18

(MacDonald)

MR. C.R. MacDONALD (National Capital Commission): Members of the Panel, C.P. Rail, ladies and gentlemen, last fall I was asked by the Panel to take a look at the proposed route for this project, particularly the service route and I made the inspection at that time and my instructions to the Panel at that time was that there was no problem constructing a rail along this terrain from the point of view of engineering.

As a result, I will not go into a lot of technical details because based on my previous experience, the soil was exposed at the time the access road was available to drive over, and it was obvious the material from the slopes from an engineering point of view would allow a railway to be built. So I make this statement here because my notes were thrown together over the last few nights, the last ones about two o'clock this morning, and possibly further on it may be misconstrued, my reference to two to one slopes.

So I will go on from there to say that after the trip last year I said the route was feasible. There were a few slides areas that would require special attention that some of the experts have addressed today, but even at that time there was nothing to alarm me that good engineering techniques could not handle.

My biggest concern and the one I

C-19

(MacDonald)

expressed to the Panel, particularly the Chairman, was that environmental reclamation was going to be very difficult in that terrain, and that was my biggest concern and most of my remarks were aimed at that particular point.

Our experience over the years is that any slope under two to one, you have very little success with revegetation. I make that statement very categorically.

For this reason, I suggested that the Panel ask for a visual impact area concentration with the view that none of us want to see money spent in vain, either by C.P. Rail or anyone else if the results are still going to leave you a scar. If that is the possibility, then let us live with the scar the same way as you live with the avalanche scars that nature makes.

So it was for that reason I asked that, okay, if you can concentrate on the areas that are highly visible, let us put our money there if we can. That was the intent. I also commented at the time, as I recall there was concern about the 15 metre limit for an access road and there was no question that that had to be acceded to in that terrain.

I also said that site cross-sections were really required for me to make any comment on whether or not workable slopes could be achieved with

C-20

(MacDonald)

or without retaining walls, and retaining walls are expensive, there is no question about that.

With this background in mind, there has been a lot of studies, as Mr. Adam pointed out, and the problems have certainly been addressed and over the last five days I have crammed the various reports as much as possible into my head, and the Panel's experts comments, and my concerns are as follows. I do not feel I can separate terrain impact, hydrology, erosion control and visual impact assessment separately. They are inter-related and I will proceed on that basis.

It is important to emphasize that with my past experience I look at the total project which I was just saying, so if I make comments in certain areas where you have other advisors, no offence intended. If we are all in the right ball-park, we will probably agree anyway.

In the case of slope stabilization and erosion control, drainage, revegetation, they are all interdependent, the Visual Impacts Assessment Study was very thorough, but I must admit I was very surprized at the number of impact areas, that is visual impact areas, and the fact that the design, despite retaining walls, was mostly one and a half to one.

In regard to revegetation, I am sorry, but notwithstanding consultants' reports and studies

(MacDonald)

and assurances and theory, human beings construction practice, as Ken pointed out and Larry, problems that develop in construction, the reality is that if you do not have a slope of two to one or better, your chance of reclamation is very low, very low and you then turn around and say if you cannot do it, then do not waste money trying to. Live with the rock face; live with the fact that you are going to have a certain amount of scars. That is the price you have to pay.

The increased slopes greatly increase the erosion factor, so your mulch and seeding and all your experts in reclamation, they do not even get to bat, because the material ends up down in the flood room.

I would suggest to the Panel, and I think I already have, that if you look closely at any of the steep slopes along your travels from Revelstoke, you do not see a very high percentage of revegetation on any of the slopes. They are very scruffy and they look scruffy and that is the situation.

So what we are dealing with is do we ask that going through Glacier Park, you have taken down all those trees, you have got to replace them. In this day and age, I suppose one could say yes, we should. You know, we are not 20 years ago; we are not 50 years ago, but just the same my comments

C-22

(MacDonald)

here are directed at the fact that you need everything going for you.

(MacDonald)

If you start with one and a half to one slope, I am sorry, and Mr. Walker is going to address this tomorrow, you are starting with your hands tied behind your back. I cannot even guarantee with the slow growth season you have in Glacier Park, and with some of the suggestions I will make here that you will be successful. What I am saying is you should try to.

So I suggest that you take another look at trying to improving the slopes with retaining walls.

The other aspect is even on the one and a half to one, you will have to use some kind of mechancial assistance to your revegetation, whether that is chicken wire scathing fabrics, you know, you name it. These are all expensive also.

In its brief C. P. made reference to a six-month construction season. Well, I do not want to get into an argument on that but it is fine for tunnel construction, bridge construction, but I question whether you are going to have six months working on the surface route. Construction on side hill mountain terrain requires well organized, well timed and site specific operations. They also guarantee no slope area will be exposed to the elements more than six months. If I am not mistaken, that is in one of the articles. I consider six months of bare slope too long. I

(MacDonald)

I realize some of the consultants have referred to the fact that there was not too much erosion in some of the soil. You are forgetting that these embankments have to have some form of top dressing.

The success of the overall project is also very highly climate related as a result of snow, rain and a short and slow growing season. I recommend that a construction schedule be set up site specific for each problem area, taking into account the best weather information and I realize that is difficult in Glacier National Park when setting the timing for each one.

Revegetation, the reclamation should take place immediately upon completion of the slope grading. This is equally important for erosion control as it is for slope stablization. I do not agree that you have time for two planting seasons. By this I am referring to fall. The slow growth and the weather just does not allow it. I would say you should plant on one, and by that I do not mean that you cannot plant in June, and you cannot plant in July, but there is a latest date on which you should plant which, and I might add at this point I had a few minutes with Mr. Walker and he agrees that probably August 1st would be the cut-off date.

In this respect possibly the answer would be that you would have to have more landscape crews to get the most done at the best

(MacDonald)

weather time with the obvious best results. This is an opportunity for C. P. to get away from the normal sequency of construction and develop a different one more in keeping with climatic, terrain and environmental requirements. This system would of necessity be spelled out in the contract documents.

In regard to bridges and the cuts and fills and the waste material, the bridge designs are certainly not showing much in the way of imagination. However, I suppose their visual impact in most cases is not all that significant. However, I suggest a look at Stoney Creek and esthetically there is certainly some room for improvement, although yesterday Mr. McKnight informed me that it is doubtful whether the long viaduct will be that visual. If it is not, well that is another aspect. If it is, then certainly I would like to see a little more originality and a little more imput into the study to the design of the long viaduct.

I am surprised at the amount of stream training. However, I have reviewed most of the bridge sites again and without grade and alignment changes there is very little that can be done. There may be enough play and I would ask C. P. in this case to have a look at it, to reduce the skew at mountain creek. The only way you can do this, of course, is a bit of

(MacDonald)

an alignment change and with the restriction of six per cent curve and one per cent grade, there is not much, as I just mentioned, room to do so.

I reviewed the cuts and fills from the Park boundary to the tunnel specifically, and Mr. Hurwitz is quite sure and quite right concerning the right-of-way. It not only exceed 200 feet but it exceeds 300 in numerous places.

I was pleased at the number of times, surprisingly,that I found 1.75 to one slope in use, because going to two to one will not be all that difficult in those areas particularly. At the same time that the adjustment is made to two to one, the possibility of additional retaining walls to reduce the right-of-way could be looked at, although I did look at some of the cross-sections myself and there, you know, there are some that you cannot touch. The retaining walls would be so high to try to achieve any satisfactory result that it would be exhorbitant construction-wise and cost-wise.

Another concern I would have and that has already been addressed is the waste material referred to in one of the reports. There are two types: the material contaminated with clearing and grubbing operations and forming part of the embankment of the access road, and the silty excavation which is located in -- well, actually a couple of specific areas, and as Larry just

(MacDonald)

dealt with, if it becomes oversaturated it becomes unacceptable. The consultant recommends its use, if I recall, as berms or top dressing, but there were certain sections in the plan that I saw the word waste used right in the fill, which I consider a questionable procedure from the slope's ability point of view. It is also not clear who decides, and Mr. Fox just dealt with that a few minutes ago, when material has had too much moisture. Since this is highly climatic sensitive, it is another argument for my site specific construction program.

Dry weather operation in these areas and you have less waste material. The design philsophy for the Griffith Slide is the same one I have used often for Leda clay along the Rockcliffe Banks home -- mass or weight at the end of the slippage plain. As you know there is a 1.75 to one. Well, of course, two to one gives you additional mass. So obviously that has an engineering advantage besides a revegetation advantage.

In summary, my recommendations are: 1) Site specific construction scheduling clearing spelled out in the contract documents. I consider construction control, and it is very difficult, and with all the effort, you know, you are still going to have slippage. It is very important though in this terrain.

(MacDonald)

2) Vegetation of slopes to take place as soon as grading is completed. No excavation of embankment to be exposed any longer than necessary but three months maximum and not six.

3) Slopes to be two to one to increase slope stability. Safety factor to reduce sheet erosion and give reclamation methods a fighting chance to succeed.

4) Scheduling of revegetation to be aimed at giving the maximum time possible for germination and rooting with a cut-off date to be set by Mr. Walker -- I just discussed it with him and it is suggested as August 1st.

5) Drainage control, of course, is imperative not only in the slide areas but in all side hill terrain. The designs, of course, to be approved by Parks Canada. I am curious and I might ask this just from an engineering point of view, why no benching is used in some of the larger fills.

6) Another look at reducing the right-of-way by use of retaining walls. I do not hold the most maximum of hope in this area, but at least I think it should be looked at.

7) Alignment adjustment to reduce skew at Mountain Creek, again, if at all possible.

8) A more esthetic design for

(MacDonald)

Stoney Creek and the long viaduct.

In closing I do not want to shock the Panel but despite the volumes of words most of it is a collection of the necessary technical data any major project requires. The concerns I expressed to you last year I feel are still with us. Any possible success for reclamation rests with these recommendations. I personally feel your final report should await decisions on these matters. Thank you very much.

THE CHAIRMAN: Thank you, Mr. MacDonald. We will now take our coffee break and come back and commence some questions on these presentations.

--Brief adjournment.

---UPON RESUMING:

THE CHAIRMAN: I should mention that I believe that we did not put out Mr. MacDonald's C. V. and he was too modest to mention it himself, but he is the Chief Engineer with the National Capital Commission at the present time. Anybody who wants any more details, they can talk with Mr. MacDonald directly.

I would like to start then with the presentation by Parks Canada and Doctor Leeson.

(Leeson)

DR. BRUCE LEESON, (Parks Canada): Mr. Chairman, this is less of a presentation than it is just a comment, and it is directed specifically to the subject to terrain impact in our submission, which I presented Wednesday night.

We talked about our concern for the large amount of terrain impact that is proposed in this project and I want to advise you that since Christmas we have spent a lot of time with C. P. Rail and their consultants examining the various generations of grade profiles that were produced, and initially expressed our alarm about the wide clearings and the large fills and in numerous instances, C. P. Rail was able to reduce those fills and cuts. However, as you can see from the drawings there are substantial ones remaining.

We do not have any further in-house technical ability to examine what is being proposed and for that reason we ask the Panel's special attention and particularly through your technical experts to comment about that and to examine C. P. Rail's proposals to see if there is a better alternative. We see that they are doing that and we are hoping that you will continue to be diligent to sure that the best is identified.

(Leeson)

In that regard when the Panel's work is all finished and whatever is approved is approved, then we, that is Parks Canada, will be faced with the need to examine the site specific proposals, and once again we will find ourselves short of technical ability to evaluate whether what is being proposed is the best or not, and I would ask the Panel's consideration of what we ought to do in this circumstance and perhaps your comments about what is done in other projects where you face situations of a similar magnitude, and whether or not the Panel has the inclination, wherewithall or the mandate to continue to provide Parks Canada with some kind of assistance so that we can look after ourselves in future weeks.

Thank you.

THE CHAIRMAN: Okay, that is a good point to bring up. I think now what I might do is ask the Panel if they have any questions that they would like to ask on these presentations, and I will give both technical experts and C. P. an opportunity to come into some.

Just for the record though, so we get this down somewhere before we finish these hearings, can we get a confirmation on what the exact right-of-way width is. Three hundred and seventy-eight feet I think was mentioned in the Red Book. I heard another figure given just

here. I had a conversation with one of your employees from C. P. Rail, one of your experts, that mentioned I think 316, and I think we are reasonably agreed on the width of the clearing average - between 156 and 158, but just for the record if you can give me those figures so we can report it to the Minister.

MR. FOX: Unfortunately, Mr. Chairman, and I should have made note of this when we started, there are one or two typographical errors in that Red Book and one of them happens to be the number of acres. The figure is 316 acres.

Now to clarify that further that includes approximately 20 acres of land where the new right-of-way almost abuts the existing right-of-way, and we felt that we should include that in the land to be taken from Parks. So it will not be worked on. It will just be left as it is today, but for the ease of preparing legal documents for land purposes, we felt we should take those narrow strips that were left between the two right-of-ways and we included that, and that amounts to approximately 20 acres.

THE CHAIRMAN: And the other figure is at 156 or 158 or can we do a deal at a 157?

MR. FOX: That number is correct

in the book. That is the number.

THE CHAIRMAN: Thank you. Bill Ross?

MR. FOX: Whatever it is, it is right in the book!

DR. ROSS: I guess my first question is to C. P. Rail, which I think I am reiterating a query which was made a couple of times. The most important issue is what are the remaining prospects for reducing the right-of-way. In any case, whether it is 100 meters or 90 meters, it is a lot more than was approved and so on in the interim fashion by the C.T.C. That is quite a wide right-of-way and I am wondering whether the continuing prospects for reducing that with retaining walls, with mechanisms such as extending the viaduct for longer stretches or things of that sort.

MR. FOX: Well, you know you are getting into a realm and I think Mr. MacDonald alluded to it. You have got to look at costs and for the sake of let us say -- we took a rough guess at it and I think you may be looking at probably 10 acres of land that we could probably cut back on on the downslope side by the use of retaining walls, and we took a look at one in particular, and we can give you an example of it if you wish to go through the thrash -- we took a look at one of the worse ones which is in the

vicinity of Raspberry Creek and very arbitrarily said we will put in a retaining wall there of approximately 40 feet in height and it would have to be 600 feet long, and what would be the ramifications of building a wall of that size at that particular location, and it goes something like this: we would save 1.7 acres, I believe it was, of land with that type of wall with the slopes we are now proposing. The cost per acre of saving would be something like $2.4 million. In the overall picture if we use the retaining wall, and this is very rough because we have not had much time to sit down and do a complete review of it, but just a broad brush figure -- the increase in cost if we use that type of a process on all the downhill slopes, you are looking at somewhere between 18 and 25 million dollars additional in cost.

More importantly if you go in to build these mammoth retaining walls like we are talking about, and they are large, you would literally tie up the entire right-of-way with a crew building nothing but retaining walls and you would be doing no dirt work. You have to maintain an access to them, and if you have to go in there, and I am sure that Mr. MacDonald will agree with me, and cut back into the slope sufficient distance to get a proper foundation. You have got excess material that comes out that you have

got to dispose of, and when you are doing that you have got such a big cut at the base you cannot get any earth equipment around the thing. You have got additional crews in there. As I mentioned once before I believe at one of the hearings, Revelstoke, we do not have proper granular material in that country to use as back fill for filtering and drainage. All this would have to be trucked in out of the Park. You are looking at, I would guess, just a rough guess, on the cost of your granular material, proper granular material of something like $20.00 a yard to haul it in there by truck.

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So when you put the whole thing together, you add, I would say, about a third to your cost, total cost and it just becomes absolutely horrendous.

Now, having said all that, having said all that, what we have been looking at all through this piece is the visual impact. That is what has been impressed on C.P. Rail from day one, is visual impact. The downhill slopes cannot be seen except in one or two locations. I cannot reclaim a retaining wall; I cannot grow anything on a retaining wall, it will not grow. So, you know, you will live with a retaining wall.

Having said all that, why would I have to go and spend an extra 18 to $25 million on the downslope -- I am just talking downslope now, not upstream, just downslope. Why would we have to spend money like that when we do not improve the visual impact one iota. Now, that is what we have got to address ourselves to.

Now, if you would like to have an example of what we have gone through, we can give you that example.

THE CHAIRMAN: Before we get too deep into that discussion, could I ask, your right-of-way is based on a square going from point to point, or a rectangle, if you like. Presumably if you went along like a sawtooth fashion following the width of your clearing you could reduce the width

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of your official legal right-of-way considerably down almost to the point of clearing if you wanted to or something like that.

MR. FOX: Yes, you can.

THE CHAIRMAN: It is just, I guess, difficult for the legal surveyors to go and do something like that.

MR. FOX: Well, you know, can you imagine the description.

MR. TENCH: Can I ask what your estimated cost, Mr. Fox, is of the surface route from 00 up to the east end of the short tunnel so that we can get a handle on some of these figures that you are giving to us.

MR. FOX: It is of the order of $65 million and that is not a precise figure.

DR. ROSS: I have a couple of other points but I think I would leave them until tomorrow because they deal more with visual impact which I think we agree is more important, and if we are going to deal with that tomorrow. then I will put them off for now.

I have two other brief points, one of which I guess is to Parks. We discussed I guess the day before yesterday the question of off right-of-way drainage and we saw a number of presentations today, Dr. Leeson, with the kinds of drainage that is being proposed.

Now, is that the sort of material

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that you were concerned with or is that the sort of material that you find acceptable, and I guess what is your view on the sort of drainage mechanisms and fluming mechanisms that were proposed here today?

DR. LEESON: If the fluming that is being described today is of the same sort that was installed in the wet bog area last fall, that is acceptable. That was put in with a minimum of impact, very few trees cut, put in by hand labour and helicopters, and if that is what they are talking about, that is pretty good.

The sort of undertaking that we do not like is what was necessary at the top of the Big Cut at Lake Louise where heavy machinery, bulldozers were taken in and ditches approximately 50 feet wide in a herringbone fashion were constructed. That is what was necessary there. That is what we do not want.

But if, in reference to fluming, they are talking about the same sort of thing that they have done already, we would find that to be quite acceptable and I would seek clarification of exactly what they are talking about.

DR. ROSS: Mr. Fox.

MR. FOX: What we are thinking of is exactly what you described, Dr. Leeson, but in any event, when the final plan is put together for those particular areas, we will see that you have a look at them before anything is done or wherever it

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is you wish to look at them.

MR. TENCH: Mr. Fox, Mr. MacDonald had about six points in summary of items that he raised, and Mr. Chairman, is this a sensible time to ask for some response from C.P. on these points?

THE CHAIRMAN: If they can respond to them. If not, we could hold it until tonight. Do you want the points repeated one by one?

MR. FOX: I am not sure we got them all down, but we had site specific construction scheduling, that was one, I believe.

THE CHAIRMAN: Do you want to deal with that one?

MR. FOX: Yes. I am inclined to agree with Mr. MacDonald on that. That really is a contractual documentation thing that you have to do and I think if you looked at our schedule of how we handle quantities, you can see pretty well that that is the sort of thing we are going to do.

So I certainly agree with that number one.

Now, he is talking about two to one slopes. I agree. I would love to have two to one slopes, but I do not know if I can get them. I would love to have it. It would stop a lot of nonsense. We would be able to do the reclamation the way it is supposed to be done, but I cannot say that I can -- I can put them in there but Parks is

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not going to like it one little bit.

THE CHAIRMAN: Well, just a second on that one. You are proposing reclamation plans, and I am assuming you considered those will be successful reclamation plans, otherwise I do not know why you are proposing, and I think that was Mr. MacDonald's point.

MR. FOX: That is right. Well, I can put it to you this way. My expert claims that he can do a job in one and a half to one slopes up to a point, and some of the slopes, as Mr. MacDonald mentioned, go back at one and three-quarters to one on the higher ones and some at two to one already. They were put in there particularly for reclamation.

Now, if my expert says he can do it, he had better well do it.

THE CHAIRMAN: I guess we will hear tomorrow from the reclamation people as to whether that is feasible or not.

MR. MacDONALD: Mr. Fox, if I could add one point there. In regard to the two to one and the reference to the possible use of retaining walls, it does not necessarily mean, for example, I suppose what I had in mind is the possibility of some areas that are going to show above the tree lines on the cuts, for example.

MR. FOX: You are talking the upslide, uphill ones now.

MR. MacDONALD: Yes. If there is

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some possibility, for example, to put a small retaining wall and for a short area you get two to one so that you can get planting on, that gets you below that tree line.

Now, at the bottom of the retaining wall you could be going back to one and a half to one or 1.75 to one and onward down. What I am trying to say, is, it is very -- as I say, I wrote that at two o'clock in the morning and you cannot sort of break it down into all the various segments, but what I am getting at is it is not cut in stone, you know. You try to find is there some area in which you could use the retaining walls up on the upcuts and actually enable you to revegetate some of these areas that are going to show above the tree line.

MR. FOX: Well, most of the upslope are ---

MR. MacDONALD: Are rock, unfortunately.

MR. FOX: Yes. We do have a lot of retaining walls up there and there is an amount of rock up there too, and what we have really done up there, Mr. MacDonald, in terms of the design of the alignment and the location of the alignment was we tried to hold it away from the uphill side as much as possible, knowing that that is the part that was going to be most visual. So that has, of course, increased the size of our downslope cuts or

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at least our downhill fills -- not cuts, fills.

MR. MacDONALD: As I say, I have mentioned that there were quite a few 1.75 to one fills, as I say, in the Griffith slide, for example, and unfortunately the darn plan shows the ground line going practically out flat at that point, so that actually two to one there could be put and then all you are talking is fill.

MR. FOX: Well, I think we have two to one on all the slide areas and that was done very deliberately.

MR. MacDONALD: It must have been changed then because Griffith is still shown at 1.75 to one.

THE CHAIRMAN: Hold on a minute here. We are going to lose the discussion altogether.

I think we were asking Mr. Fox to reply to the various points and then maybe when you have replied to the points we can come back on them, otherwise I am going to lose the discussion completely.

MR. FOX: I think another point that Mr. MacDonald raised, or we have anyway, is the revegetation as soon as the slopes have been completed. I agree with you there, too, and that is what we propose to do. I think if you looked at our scheduling diagram, it indicates that.

I think the next thing was your scheduling of actual construction. I think you made some remarks about short working season, and we should

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work in the best part of the season.

MR. MacDONALD: Again, that was an argument supporting the site specific generally.

MR. FOX: Right. Well, the work season in that country there is somewhat longer than you have alluded to, Mr. MacDonald, and I appreciate that coming from Ottawa you perhaps would not have all the facts.

You can generally go in there somewhere between June 1 and June 15 and you can work through very safely to about the end of October, sometimes later than that.

MR. MacDONALD: Just one moment now, on the fill?

MR. FOX: I am sorry?

MR. MacDONALD: On the fill?

MR. FOX: Yes, you have good weather all the way through there.

MR. MacDONALD: Then you go through the complete winter with an exposed ---

MR. FOX: Well, you are bound to get some of that. But you know, the best you can, you will cover the revegetation and what has been completed. If it is not completed, as you well know in the construction game, is it is rather tough.

Anyway, it is something that has to be watched and you do the best you can. Now, a lot of these fills will be done progressively too, hopefully.

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One other thing I wanted to say and I did mention to you this when I was having coffee, the elevations up there are not quite as bad as one would have you believe. The elevation at Rogers, for instance, is 2640 feet above sea level, and at the east portal of the short tunnel it is 3200 feet above sea level. Calgary is 3500 feet, so you can get sort of relative values, and that is good growing weather usually up there, which is in our favour hopefully.

Benching. We stayed away from benching. We have done it in the past and it has only been moderately successful, if you could even call it that. For that reason we did not, in this case, go to benching at all. We did a line diversion some years ago down near the Cranbrook area where we put in extensive benching and it really turned out to be very much of a disaster. We wished afterwards we had never gone near it.

So we have had experience in it and we really do not see that it gives you much value, if any at all. Sometimes it gives you no value at all, it is worse. So for that reason we stayed away from it.

Alignment of Mountain Creek. That is a toughy because we are coming in there on a six degree curve, going across the river and then coming off at another six, and the constraint there is there is a campground at that location.

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MR. MacDONALD: The one on the other side is a five.

MR. FOX: I am sorry?

MR. MacDONALD: You come in on a six and leave on a five.

MR. FOX: Well, they are just about the same. Six and five, I stand corrected.

Anyway, to straighten it out and maintain your alignment further east, which we are pretty well tied down to for various other contraints would mean that we cut right through the top part of the existing campground, where I believe they have some sort of a theatre set up there. We have deliberately stayed away from that because of Parks' concern about what we would be doing.

In addition to that we tried to get it into a location so we could get a berm so it would cut down the sound going through there. So there are constraints.

MR. MacDONALD: It is a case of trade offs.

MR. FOX: That is right, and I would love to have a nice square crossing, too, as I am sure everybody would.

THE CHAIRMAN: George Tench, you have a question.

MR. TENCH: Bless you for getting me back on the track again.

Parks, you heard the discussion

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between the two experts here which would leave you with quite a lot of blank faces as far as I am understanding the scene. Is this news to you? Were you anticipating this? In other words, surfaces that are possibly visible that according to Mr. MacDonald, it does not appear to be feasible to try to revegetate.

DR. LEESON: No, that is what we have been saying all along, that we think the reclamation is overly optimistic, that it is going to look like heck. There is going to be a terrific impact, and when it gets there, everybody is going to be surprised. They are going to say, boy, that is a terrific impact on the park.

THE CHAIRMAN: Were there any more points from Mr. MacDonald you had to deal with?

MR. TENCH: Yes, there was one here. It was suggested that some of your bridge design was perhaps rather antiquated and maybe you could do yourselves a little better.

MR. FOX: Well, I guess if you are one engineer you will say my design is the greatest, and if you are another engineer you will say it is no damn good, and that is the way life goes around. Is that not right, Mr. MacDonald?

Anyway, what we are looking at up there, we are looking at a possibility of a precast

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type concrete structure if that is at all feasible. We have some problems in our mind about the weight of that type of a structure.

Another structure that probably will be put in there is going to be a steel type trestle with deck type girders on top. Now, they are not all that bed. We have one down at Lethbridge. I do not know if you have ever seen it, Mr. MacDonald. It is 6,000-odd feet long; it is 340-off feet high. It is rather a striking structure. It stands out in the skyline very nicely. In this case of course you will not be using steel that you have to paint. You will use the corten type steel which I consider to be a nice maroon colour after a year or two. That may not appeal to some people, but it is a nice looking colour.

For instance, there is the one we put over the highway at Lake Louise. That is the type of structure I am thinking of, that colour anyway.

MR. MacDONALD: Just do not use concrete abutments, they stain them.

MR. FOX: I am sorry?

MR. MacDONALD: Do not use concrete piers or abutments, they stain them.

MR. FOX: Well, you will get some staining at times, that is right, but hopefully if we put a trestle up, that is exactly what it will be. It will all be corten right down to the foundation.

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The other structures are basically a railway type structure that we use quite extensively throughout the railway, and I think for the most part if not -- I guess one exception would be Alder Creek, they are all deck type structures and rather clean lines. Now, I know you can dress up bridges to whatever extent, but ---

MR. MacDONALD: You are talking the deck plate girder?

MR. FOX: That is right, with a ballast type deck on top of it. No open deck or anything like that.

Anyway I hear what you say and I will scratch the bridge boys a little bit and see if we cannot do some little fancywork, but I think Mike McKnight is right, you are not going to see that big trestle at all; that will be well hidden.

THE CHAIRMAN: I think, George, did you have another question?

MR. TENCH: That was not my question. The big trestle is going to be entirely out of sight of the highway?

MR. FOX: You will never see it from the highway, not unless the guy is on a boom type ladder or something.

THE CHAIRMAN: To deal with this question of the retaining walls, I realize you mentioned a question of task, but there was, in a presentation by Mr. Hurwitz or Dr. Adam, reference

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on page 8 to what they considered to be a problem area, Station 284, and I think it is to Station 384 although you may have said 284 in the record, I think it is to 384.

They are talking about downslope retaining walls. Mr. MacDonald, I believe, was talking about upslope retaining walls. Now, I would like to ask a question to Mr. MacDonald and to C.P. as to whether the use of retaining walls in that area is feasible and whether it is a question of cost being the problem in that particular area, that it makes the cost per acre very, very high.

MR. FOX: We are talking the downslope ones?

THE CHAIRMAN: That is what I understand since it is fills, they would be downslope.

MR. FOX: My remarks that I made initially covered the downslope ones. I was under the impression that Mr. MacDonald was talking downslope walls.

MR. MacDONALD: You were right in the sense that when I was dealing with the right-of-way you would, in all likelihood, use some downslope and upslope to have any success in reducing it.

MR. FOX: But that is what you would have to do.

MR. MacDONALD: When you get into

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reclamation, of course, I was really more concerned with the upslope which is the visible ---

MR. FOX: Right.

THE CHAIRMAN: I believe in that particular area that is pretty visible, in that 294 to 384. Maybe, Mr. MacDonald, would you see retaining walls being feasible? That is one question. The second part of the question is economics on them.

MR. MacDONALD: Well, there is no question, you can build retaining walls. It is a case, you know, the size, how much do you want to move -- I presume, is it for the right-of-way reason, Larry, the reason for the retaining wall that you are talking about right now.

MR. HURWITZ: Basically, yes. It was in reading the description, pages 31 to 36, retaining walls were considered and apparently rejected. I thought that it would be a possibility to reduce some right-of-way requirements at certain fills, not necessarily all fills in that section. Mr. Fox said earlier that you cannot see them anyway, which I was not readily aware of. You know, if you cannot see them, maybe the fill is satisfactory. On the other hand, saving 100 feet of trees in clearing seems to be a reasonable thing to do, but this economic question is one that has to be considered too.

THE CHAIRMAN: I think that is a pretty visible area just looking at my version of

what is around the walls here, and I guess the question to Mr. MacDonald, or the answer is you can put them downhill as much as you can put them uphill, and your idea of going to two to one and then benching down with a retaining wall applies.

MR. MacDONALD: I think it is important to realize, you know, our geotechnical experts mentioned before that in most of the cases the material is pretty sound material and you can bench into it and you can put a retaining wall, as Mr. Fox said. It is a case of height and cost and results.

For example, if it is visual, again, I think you have been using a green coloured one I think at the east portal, if I recall.

MR. FOX: We have got green there, a pretty pale sickly green and we cannot put any more colour in it or we ruin the concrete.

MR. MacDONALD: I do not know how Parks Canada feel. What does that look like through the trees? You know, in plain English, does that look better than looking at a fill? These are the things that you are looking at.

MR. FOX: Well, let me just get something clarified. What fills are we talking about so I can get a handle on it.

THE CHAIRMAN: Page 8, presentation by I.D. Systems, last five lines.

MR. FOX: Well, the fills, and I

will start at Station 304, right through to 360, you cannot see the bottom slopes. There is a little bit of an opening just beyond 360 in the wet slide area, and I would not put a retaining wall in there because the foundations are not good. You can see a little bit of fill just west of 364. Without looking at the actual cross-sections, I do know whether a 30 or 40 foot high fill would bring you up to the top of those trees of not.

THE CHAIRMAN: Particularly between 360 and 380 in there, there is an area.

MR. FOX: Three-sixty to 380, you do not see any of them in there.

The first one you see is almost Station 400 and there is another one at about 407.

THE CHAIRMAN: Then those must be cuts rather than fills in that area.

MR. FOX: Yes.

DR. ROSS: I wonder, Mr. Hurwitz, if there are other questions in your submission which we have missed which we want to go back on?

MR. HURWITZ: The question of why the right-of-way and width cleared, are my numbers right there that I generated on page 8?

MR. FOX: Well, the total acres involved that will be taken in terms of property is 316.

MR. HURWITZ: So that is reduced from the 371?

MR. FOX: That is right.

MR. HURWITZ: Then the right-of-way figure would go down. The clearing figure, on average, 156. I recognize that it is variable.

MR. KLASSEN: The book says inside the park for clearing 158.

MR. HURWITZ: Yes, I am talking width, though, Meryl. I am not talking area.

THE CHAIRMAN: I think the question is the right-of-way being doubled to clear the width is because it is going point to point. That is what we were discussing earlier on, rather than following the cleared area. Was that the point you were trying to elaborate on?

MR. FOX: Mr. Chairman, I have a hard time in following. I appreciate that we are taking somewhat more acreage based on what was shown on the board plan, and the board plan shows we required a minimum width -- or it did not show a minimum. It showed a width of 200 feet, 100 feet each side of the center line.

As I recall and without going into the proceedings, but as I recall last year, we had a rather lengthy discussion on the right-of-way, and it was indicated, as I recall, to this Panel that ina number of locations we would have to take more right-of-way than shown on that plan because of what the fills and cuts would do to us. I think I am right when I say that.

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THE CHAIRMAN: I do not ever remember 200 feet being on the record in these meetings. I have looked back at them and I think the only thing we talked about is what became apparent was the initial right-of-way and having to go beyond that.

MR. FOX: Well, I think if you look into it closer, you will find out, I think you were talking about one thing and we were talking about something else because I distinctly remember Mr. Wakeley making the point that we would require more right-of-way in the final analysis than the 200 feet shown on that board plan.

THE CHAIRMAN: If you can show me the record, I would be very pleased with that information.

MR. FOX: In any event, regardless of what was said, and we did have a discussion on it, the fact remains that if you are going to build in a territory such as we are building in, you cannot live within a band, be it 200 feet all the way through it. It is just a physical impossibility, and having said all that, 316 acres of land and as I indicated there is about 20 acres of that to make up the difference between the two property lines where they come close together, you know, you are talking about a pretty small farm, to put it in its proper context.

DR. ROSS: You may be looking at a small farm, but you are also generating, I think it is generally agreed, a potentially significant

impact on the park.

MR. FOX: No, I do not agree, Dr. Ross, because we have done it on the downhill side.

DR. ROSS: Well, several people have indicated that they believe this has potentially significant visual impact in the Park and I think we may be heading to the point where we have to deal with the visual impact and for that reason I am inclined to wait until tomorrow, but I think what is crucial here is your ability to undertake a good reclamation scheme which will mitigate this visual impact because ---

MR. FOX: I agree with you.

DR. ROSS: I think that is crucial because there are areas which unmitigated would clearly be a serious visual impact and I think what we are trying to deal with is some mechanism for reducing that impact which we I believe now all agree is significant.

MR. TENCH: Is this right-of-way acreage something that Parks have realized all along or are these figures much larger than they anticipated?

MR. GALLACHER: In order to give you an answer to that, I would have to check with the property people, the realty services people because they have been working on this and I think it is somewhere around what we expected from the preliminary discussions I had with them.

THE CHAIRMAN: Bill Ross.

DR. ROSS: The Cedar Creek diversion, Parks, is that current plan, which I guess is the east diversion now, is that looking reasonable? I understand you had some objections to the west diversion plan which existed a week ago?

DR. LEESON: We objected to the west diversion plan because it affected wet lands in the Beaver Valley and Mr. Fox's beloved beaver would be impacted.

So we asked why can it not go to the east, approximately where it is now. That has been investigated and regretably there is a large amount of terrain impact with that too. It has just recently been shown to us.

So whether one is going to be a lot better than the other, I do not know. We now have to have a detailed examination of it within the Design Committees.

DR. ROSS: That was what I was essentially asking, how you compared the terrain impact of the east diversion with the benefit for the wet lands below?

DR. LEESON: We have not done that yet, Dr. Ross, but we will do that in Committee.

While I am up here, can I ask a question?

THE CHAIRMAN: Sure.

DR. LEESON: On page 10 of Mr.

Hurwitz's and Dr. Adam's presentation with respect to hydrology, they ask the question about the dyking, particularly Mountain Creek as far as we are concerned, and I would like to have that question answered as to whether or not it is possible to do it some other way, and also clarification as to the material source.

THE CHAIRMAN: I believe Mr. MacDonald had some questions about dyking as well, or training walls as well, which I am not sure we have had answered so perhaps you could deal with that in generality?

MR. FOX: Well, the dyking, I do not have my plan in front of me, as I recall is not in the river at all. It is on the river bank in the dry, and it consists really of heavy stone type wall which will deflect the water away from back of the abutment. That is all it is. It is not in the river at all, and it is very similar to existing training walls that already exist in the Park.

If you would like to have the name of one that you would like to go and look at, there is one on the Beaver River leading over to the Parks gravel pits, very, very similar to that one right there. So far as where the material comes from, all it has to be is what we call one man stone, and we will probably be making that out of some of the stonework -- I say probably. We will be making it out of the stonework as we go alone the route and haul it up there and have it placed. So it is not

going to affect the bed of your stream or any part of your stream. All it does in terms of times of high water, when the water comes down there is a bit of a bend there and to deflect the water away from the side of the abutment we will put a wall in there and make sure the water does not get in behind the abutment and cause a washout. That is all it is there for. It is strictly a safety thing. It will not be in the river at all.

THE CHAIRMAN: Mr. MacDonald, do you have any comments?

MR. MacDONALD: Yes, is it possible to do it with native stone, native to the stream itself?

MR. FOX: If they will let me take the stone out of the river, Mr. MacDonald, I will be glad to take it from that source.

THE CHAIRMAN: Parks, I think I know the answer, but do you want to tell us whether you would allow that to do?

DR. LEESON: Is this a Gabion type of structure?

MR. FOX: No, it is just stone that is piled up in a wall about yeh high.

DR. LEESON: Sort of a drywall type of ---

MR. FOX: That is correct.

DR. LEESON: Well, I do not think we would be too keen on having it taken out of the

river in the method that it would be necessary to do so.

THE CHAIRMAN: Fair enough. Are there at this time any questions from members of the audience public concerning any of these presentations?

Perhaps Dr. Adam, Dr. Hurwitz, have you got any points that you would like to raise concerning any of these presentations?

DR. ADAM: I think the only point I would make is to make sure people realize that there is a connection between the concentrations I mentioned and the concerns that Mr. MacDonald expressed with regard to erosion. There is a very real connection there that can only achieve those concentrations in a stream if you have the protection to stop the erosion or sediment traps and so on, so there is an unlying concern to that requirement that I ---

THE CHAIRMAN: You are suggesting a quantitative standard to deal with a perceived problem?

DR. ADAM: That is right.

THE CHAIRMAN: The other method is, of course, the scheduling which Mr. MacDonald is suggesting.

C. P. do you have some points you want to raise at this time on this topic?

MR. FOX: Perhaps I can come to it, Mr. Chairman. I would like to make one or two remarks on the I. D. Systems Paper. On page 5, it indicated that we were conservative in our design for drainage structures. I agree that we are conservative. I do not know whether I said it at this hearing or not but the experience that I have had in mountain streams is that you do not play games with a mountain stream; you put lots of opening in there because you are going to need it, and if you cut corners you have a big bill to pay. I agree with what you say and we are over conservative for that particular reason.

Visual monitoring that is -- we are going to go a little bit further than that. We are setting up a monitoring system to actually test the waters both upstream and downstream. I do not know whether that has been covered yet or not. Doctor Foster will be covering that, and the total solid suspension, he should be covering that at the same time. That is on page 7.

Another on page 7 about the concerns

on whether this Crow Rate business delays the construction. I cannot tell you when it is going to be passed. I do not control Parliament, but there is an agreement in place between Parks Canada and C.P. Rail as what will be done in the event that that agreement, or at least that Rate is not fixed and we do not go ahead with the project. There is an agreement in effect that takes care of that. That was signed last year.

DR. ROSS: Mr. Fox, could tell us roughly what that agreement says?

MR. FOX: What it says is that if we do not start before July of 1984 we have to go in there and reclaim the whole thing; reclaim it in the sense that we do the complete reclamation work.

Now to come back to your question and perhaps you could repeat it for me to make sure I understand, Doctor Adam, that you were talking about whatever with the Chairman?

DOCTOR ADAM: It is simply that in order to meet 500 miligram per litre concentration downstream, you are going to have fair control of erosion on slopes and so on, and so it is just another way of coming at the concern that Mr. MacDonald expressed. Just to tie it all together it seems to me that it does not make much sense to treat your waste water from tunnels and so to bring it down to 60 and put it into a

stream that has a suspended solids concentration higher than that. It is just that it all -- just to be logical, I think you have to be talking at least in the same order of concentrations.

MR. FOX: Okay, I am not an expert in that particular field myself, and I would like to defer that answer to Doctor Foster, who will be giving a talk on that thing tomorrow, and could we keep that in abeyance until that time, or you can have an answer now if you would like to bring him forward.

THE CHAIRMAN: Well, maybe we could deal with that one now if it is possible to do so.

MR. TIM HOLLIBAUGH (MacLaren Plansearch): Okay, the tunnel effluent will not be discharging into any of the streams crossing the right-of-way. They will be discharging into the Illecillewaet River or into the Beaver River, which are removed by some distance from the right-of-way. Now it is true that the streams which are draining the right-of-way eventually wind up in the Beaver and the Illecillewaet Rivers, or, well, the Beaver River rather, and they will be monitored.

DOCTOR ADAM: I realize that but it is just a matter of principle of why would you treat water to bring it down to that concentration coming from a tunnel and yet you let it run off

slopes into streams and create much higher concentrations.

MR.HOLLIBAUGH: No one has proposed to let it run off the slopes and create much higher concentrations.

DOCTOR ADAM: Right, and that is the suggestion, and Mr. Fox has assured me that that is in the plan.

MR. HOLLIBAUGH: Right.

DOCTOR ADAM: Right, but it is just that the two to me are tied together in that there is no point on one hand treating it to bring it down to one level and at the other -- on the other hand not having any criteria. That is simply my point.

MR. FOX: I see what you are getting at now. What Doctor Adam is saying is if we treat the tunnel effluent to a certain level, we should treat all other streams either to the same degree and monitor to see if we have that -- I think that is what you are saying.

DOCTOR ADAM: That is right.

MR. HOLLIBAUGH: Which I think is what we plan on doing anyway.

MR. FOX: Exactly, exactly.

THE CHAIRMAN: Do you have any more points Mr. Fox that you want to cover at this time?

MR. FOX: I do not think so. Thanks.

THE CHAIRMAN: Do we have any final points from the technical experts at this time? -- Members of the audience? -- Panel?

MR. MacDONALD: Mr. Chairman, I could say going back to the retaining walls I do have specific sections and unfortunately they are up in my room, and I can give them to Mr. Fox for tomorrow, you know, so we can deal directly with the area you are talking about. I have sketched the two to one slopes on and retaining walls and I do have section site specific that it is possible to look at.

THE CHAIRMAN: In order to make this as expeditious as possible, maybe you and Mr. Fox could sometime have a look at what you have got and I can know then whether you are in agreement or disagreement without trying to stretch plans out and discuss the whole thing. It is rather a difficult forum to go into that.

MR. FOX: Maybe we can do it, you know, downstairs here -- no problem.

THE CHAIRMAN: I think I hear a hint here.

MR. MacDONALD: Wait until he finds out I drink water!

THE CHAIRMAN: That will maintain your independence. I think at this point unless there is any further questions or points anybody wants to bring up, I will now adjourn the meeting

until this evening.

This evening we have a general session and we have a couple of presentations from groups to take and we also have the question of work camps. So we will now adjourn until 7:00 o'clock. Thank you.

--- Adjournment at 4:50 P.M.

ROGERS PASS ENVIRONMENTAL
ASSESSMENT PANEL

PUBLIC MEETINGS

CP RAIL ROGERS PASS DEVELOPMENT PROJECT

PLACE: Calgary, Alta.

DATE: June 10, 1983.

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ROGERS PASS ENVIRONMENTAL ASSESSMENT PANEL

In the matter of Public Meetings of the Environmental Assessment Panel on CP Rail's proposed new track development in Rogers Pass.

PANEL MEMBERS:

P.J. Paradine -- Chairman

Dr. W. Ross

Mr. G. Tench

Held in the Sandman Inn, Petroleum Room, Calgary, Alberta, on Friday, the 10th day of June, 1983, at the hour of 7:00 p.m., Local Time.

VOLUME IIIA

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THE CHAIRMAN: (Mr. Phil Paradine):

Good evening Ladies and Gentlemen: I am Phil Paradine, Chairman of the Environmental Assessment Panel reviewing C. P. Rail's proposed work in Rogers Pass in Glacier National Park, and the other members of the Panel are on my left: Bill Ross and George Tench. I did make some opening remarks this afternoon explaining the nature of our review. I will not repeat these again these evening. What I would like to do is right away provide the opportunity to any members of the public who want to make a presentation to come forward. M.P.P.A.C. is registered to speak this evening. I am not sure whether they are here yet. Is a representative of M.P.P.A.C. here? -- Evidently not.

I guess in that case we would proceed immediately to a presentation by C. P. Rail if your man is here, and I believe C. P. Rail would like to address the question of work camps, and we will get back to M.P.P.A.C. when they turn up.

MR. JOHN FOX, (C. P. Rail):

If I am missing my bear expert, he will probably come in while I am carrying on here.

Ladies and Gentlemen, Mr. Chairman: Prior to the April, 1982 hearings C. P. Rail requested permission to construct work camps at Flat Creek and Beaver. These camps were to be established at two previously disturbed sites and operated from 1984 to 1988 to house construction crews for the Rogers Pass tunnel and ventilation shaft.

Concern was expressed that bears may be attracted to the work camps, which could result in danger to the occupants and the need to trap, remove or destroy the bears. There was also an indication that Flat Creek was an area traditionally used by caribou. As well, questions arose about our plans for the water supply and sewage systems at both camp locations.

To investigate the bear and caribou concerns, we gathered information on campsite history and known use of the areas by the two species. Our findings, detailed in the report submitted for the hearings, indicate that both sites were occupied for considerable periods of time without serious bear incidents. Flat Creek was operated for several years as a boys' camp with tents as living accommodation. The conclusion

(Fox)

reached on bears at both sites was that very intensive management and fencing was recommended to reduce to the minimum the potential for conflict with bears. Our consultants also concluded that there was little chance for negative effects on the small caribou population.

Parks Canada were presented with our findings in February, 1983 and supplied with a draft report in March. At a review meeting in April, 1983, Parks Canada informed C. P. Rail that although they found the report satisfactory, they were going to oppose the camps in the park in principle and the reasons given were:

Firstly, site disturbance:
They felt that the potential exists for disturbance outside camp boundaries during their operation.

Secondly, loss of park facilities:
Both areas are presently used a trail heads.

Thirdly, aesthetics:
The camps will be a source of undesirable noise, odour and light.

Fourthly, social:
Large work camps can lead to unpleasant social experiences for park visitors at picnic areas, campgrounds and other park facilities, and

Lastly, environmental:
They list wildlife conflict at camps, potential for pollution from sewage and fuel storage, increased bear relocations, and impeded access from

(Fox)

Trans Canada highway during high traffic volumes as further reasons to oppose the camps.

We made our requests for the Flat Creek and Beaver site known to Parks at least two years ago. We are concerned that after all that time we are suddenly presented with these new reasons to deny us the camp sites, especially when it was stated to us when we developed the study guidelines with Parks that their only concerns at the camps were for bear and caribou.

One of the major factors against relocating the camps outside the National Park is the increased travel time from outside camp sites.

An alternative camp site to the Flat Creek location was found at Illicellewaet Siding located about 5.5 miles west of Flat Creek. An alternative to the Beaver Camp was found 9.6 miles east adjacent to the Trans Canada Highway at the Rogers Pusher Terminal turnoff. The additional travel time for outside the Park camp sites (from the outside sites to the point where the route passes the sites inside the Park) was estimated at 17 minutes for the west portal work force and 22 minutes for the east portal work force. All travel time for construction workers is paid at double time. Given an average cost per man hour to C. P. Rail of some $40.99, this amounts to an

(Fox)

average hourly rate for travel of some $81.98. The bare minimum total estimated cost of relocating the camps outside the Park is approximately $33.3 million. Over the entire life of the project, the estimated lost time due to additional costs will also arise due to additional vehicle costs, maintenance, escalation, et cetera.

Also, the further the camps are from the worksite, the greater the risk in encountering delays, particularly during the heavy winter snow conditions. Considering these uncertainties, the contract would certainly increase its estimated cost to a total of around $38 million to account for the additional travel.

We have identified alternatives in the Park and have found one that is a suitable alternative to the Flat Creek site near the Glacier Siding. Illustrations of the site are given on the side panels, and the proposed camp locations are as follows:

Flat Creek: This camp would house 420 men. A detailed layout of the camp is submitted separately from this Report. The site is an existing flat, disturbed area and will require very little work to improve. There is sufficient water available either from the Illicellaweat River or a well. An adequate area exists for the camp to

(Fox)

be constructed. The Flat Creek site was occupied from the early 1900's to the early 1970's by wardens. In the 1970's, a conservation corps camp was run for boys and in 1979 all buildings were removed.

Beaver Camp Site would house 460 workers. There is ufficient water available from a well or Connaught Creek. This site was used as a camp by the crews working on the Trans Canada highway between 1951 and 1954. This site is a flat disturbed area and will require very little work to improve.

This site at Glacier is located on a plateau above the west portal of the Connaught Tunnel. The site is presented as an alternative to the Flat Creek camp site. The proposed camp would house some 420 men. The site was used for a camp site during highway construction, and I might also say when we were constructing the Connaught Tunnel. Operators for the west portal facilities were apparently housed at this site for a number of years. A detailed layout of the camp has also been produced. This is the site that C. P. Rail prefers in lieu of the Flat Creek site.

We feel that the concerns of Parks Canada can be reasonably addressed by establishing the camps in sites previously used for similar facilities. It is proposed to build

(Fox)

the camps with landscape and other considerations with emphasis on protection of existing vegetation and visual qualities of the area. We are proposing several strict construction and management procedures which will minimize the effects of the camps on the Parks environment and users.

Management: C. P. Rail recognizes the need for thorough development and planning of the design, construction and operation of the camps. Recognizing that tunnel contractors may have other immediate priorities, and that planning and design are necessary before award to these contractors, C. P. Rail has decided to handle through a designated contractor the total turn-key development and execution of the camps. This will give C. P. Rail the greatest degree of control and influence over the operations to meet the terms and conditions as laid out and as per agreement.

All buildings utilized will be of modular construction, completely assembled and trucked to the site. All buildings will be interconnected by fully enclosed walkways, limiting sound emissions. Construction activity should be limited to 8 to 10 weeks at the project on-set and 4 weeks at the completion. Installation shall be by a crew of approximately 30 men using trucks and cranes. The crews, that is the erection crews, will commute to accommodation. That is, they will stay outside the Park at either Golden or at

(Fox)

Revelstoke. We hope to start construction in September of this year, immediately following the Panel's approval. All services will be installed and above ground utilidor, including fire lines, readily savageable at project completion.

Layouts of the camp buildings will minimize site disruption and provide separate kitchens and offices from sleeping accommodations.

All buildings shall have snow roofs and aesthetically coordinated trim and skirting as shown on the drawings. Units will be double-decked where possible to minimize space requirements within the cleared areas on the sites. The kitchen will be of new construction and specially designed to provide for the following features:

Bear proof grocery storage,
Bear proof garbage storage, and
Efficient ventilation and exhaust to minimize escaping odours.

The camp will be managed by the turn-key contractor responsible for the design and construction so that all plans and systems are implemented as initially approved.

There will be a gate house manned 24 hours per day with a fire patrol and security. A gate on the access road will also restrict traffic.

(Fox)

On site-parking or parking in the National Park will be forbidden to all camp residents. Contractors will provide parking areas in the Revelstoke and Golden areas and bus transportation to and from town and to and from work sites. This will minimize "in Park" areas needed and traffic flow congestion. The cooperation of the British Columbia and Yukon Territory and Building Trades Council is required to implement and enforce this rule.

Each camp shall have a resident camp manager at all times on the premises whose responsibilities will include enforcing camp rules and regulations and enforcing operational guidelines, especially those pertaining to the National Parks.

No firearms shall be permitted.

Feeding of animals shall not be allowed. Residents shall be subject to immediate dismissal for feeding animals.

Garbage shall be hauled from the camp daily to an approved dump outside of the National Park. It shall be stored in bear proof steel compactor bins near the kitchen.

Snow shall be removed from campsites to an approved location outside of the camps and to an approved site within the Park.

Strict rules shall be drawn up with Parks Canada's assistance to establish

(Fox)

guidelines for resident activities outside of the camp boundaries.

The sewage treatment system shall be of the rotating biological compactor or an R.B.C. type and capable of meeting Environmental Canada "Guidelines for effluent quality and wastewater treatment". For a camp this size the sewage plants would be enclosed.

It is proposed to twin the system, providing an exact duplicate of the rated system with an independent power source. This will ensure that there are no accidental discharges of unprocessed sewage or waste water into the adjoining creeks.

An effluent will be monitored by a member of the full-time camp maintenance team to ensure adherence to the proper standards. A complete parts and maintenance package would be kept on site. Sewage plants would be enclosed.

Water is available at the sites in wells. If this source is insufficient, water will be drawn from adjoining creeks, pumped to storage tanks within the camps and circulated by a pressure system. Fire water storage will also be provided. Treatment is not anticipated, but clarification may be necessary during spring run-off by means of a simple sand filter system.

Power for the camps will be supplied initially by diesel generators housed

(Fox)

in vans or buildings. Special attention will be given to muffling noise both from camp residents and the Park environment. It is hoped that by late 1984 to convert camps to hydro-electric power. A full-time maintenance man will be available to service generators in case of a breakdown.

Propane gas will be supplied for kitchen cooking, fuel and bunkhouse heating. Storage shall be in approved tanks mounted on concrete and protected from vehicular traffic.

Camp lighting will be the minimum acceptable. Because of enclosed walkways and restricted parking, very little exterior lighting is needed. This will minimize the lighting effect on the Park environment.

Following dismantling and removal of the camp, it is possible within 4 weeks to totally reclaim the site. All materials would be removed along with all services and buildings. Recontouring of the land, replanting or reforestation would be done under the direction of the Parks.

Parks Canada will be consulted before removal of services to determine if they would like any of the services left to facilitate campground or picnic area construction.

Now to the question of bears. I could almost say it is getting me down but I will not. It has been recommended that we fence the entire perimeter, and I might say that this is our

(Fox)

consultant who made this recommendation, that we fence the entire perimeter of both camps to reduce to a minimum the potential for serious conflict with bears. We have considered this recommendation. However, we are faced with a dilemma. The perimeter fence would require considerable clearing at all sites. Parks will not allow this. The fence also presents snow removal difficulties.

We, therefore, feel that the compromise we are suggesting is the best one from a practical point of view.

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(Fox)

We propose to construct a fence around the garbage compactor, loading dock and storage room access. This fence will be electrified and built so that it can be removed during the bear's dormant period, December through March, which is coincident with the heaviest snow season. This fence, coupled with the fact that strict regulations can be enforced because the camp will be owned and operated by C.P. Rail will, I am sure, give the highest level of protection of any facility in the Park.

We feel that the combination of daily removal, strict operating procedures, odour suppression, and high levels of sanitation, combined with Dr. Herrero's preferred design of electrified fence in this area, maximum effects can be achieved for ten percent of the cost of full fencing with no additional forest cover removal.

The Environmental Coordinator will have, as one of his major duties, the job of ensuring the camp bear management standards are strictly adhered to.

I have asked Dr. Steven Herrero, who has worked with us over the past year, to discuss his thoughts on the bear management aspects of the camps.

At this time I would like to ask Dr. Herrero if he would come up and say a few words, please.

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(Herrero)

DR. STEVEN HERRERO: Thank you, Mr. Fox. I think for those of you who are interested in the details of what can be done to separate bears and people, the report which I submitted is a better source than the oral comments which I will make because I was able to clearly organize things there.

Essentially, I started out -- you know, you can lay things out one by one and step by step in the report. I started out with the knowledge that black bears could be kept out of bee yards and camping areas by virtue of electric fencing. I was skeptical that the state-of-the-art technology was sufficient or sufficiently demonstrated to be able to recommend that grizzly bears could. However, I canvassed all of my colleagues in North America who are working in this area and they convinced me, by virtue of looking at multiple sites where electric fencing had been used, very high standard electric fencing, where electric fencing had been used to keep grizzly bears out of work camps and out of the dump in Jasper Park.

In fact, in Jasper Park the electric fence was put up after the bears had habitually used the sanitary landfill, as it is called, for several years, and it was successful in keeping them out. So I reached the conclusion that the state-of-the-art technology was such that a fence built to high standards would serve as both

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(Herrero)

an electrical and a physical barrier to bears, and those standards are specified in the report which I submitted.

It was not my purpose in generating this report to comment on the desirability of locating the camps inside or outside of the Park and I do not comment on that, and I will not here, particularly.

However, I did report that there was a feasible technology, or what appeared to be a feasible technology to keep bears out of camps. Now, that technology, it turns out, is fairly expensive and Mr. Fox suggested that it would cost something like $100 to $150 per foot to construct the fence which I recommended, and the total cost would be somewhere between $125 and $250,000 for each camp. So, I will let that be thrown into the economic hopper because I know there are a number of larger figures being bantered about related to the location of the camps.

There was, however, several unresolved issues regarding the camps and their function with regard to bears which I brought up in the report and are worth mentioning here.

Probably the most important one is an engineering problem which I never fully resolved in my mind, and since then, I have not seen fully resolved by any of the proposals. However, there

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(Herrero)

has been quite a bit of work done on it, and that is the question of whether this fence, which is essentially a cyclone fence, if it were to be built, inside or outside of the Park, this cyclone fence eight feet tall, electrified system, whether it could be maintained with the high snow loads that occur in Glacier Park. Somehow or other, that snow has to be removed or it is very likely that the combined snow movement or snow creep would probably do serious damage to even the stoutest fence.

Now, one of the things I suggested in the report was the possibility of metal sleeves in the ground whereby the fence could be removed from December 1st through about April 1st. Now, there would be a few bears out during the time when the fence would be removed, but another thing that I recommended in the report was that the garbage facility and kitchen area be built to bear-proof standards in addition to the electrified fence on the outside. In other words, I recommended multiple levels of protection against bears so that if one system failed or one system had to be taken down, then there would be a backup system.

But the snow problem and the snow removal problem has never been completely detailed to my satisfaction and remains something which is a crucial factor. It is identified throughout the report. I know C.P.R. has been concerned about it

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(Herrero)

and has done quite a bit of design work, but it is a factor which could result in the fencing being ineffective.

A second very important factor in the maintenance of camps in bear areas I got from talking to some of my colleagues in Alaska who had experience in designing the Trans-Alaska pipeline system of camps. One fellow in particular was responsible for bears and other carnivores and their interaction with those camps. TAPS was a big project which went through very important bear country, both black and grizzly bears, however, it was not in high snow fall areas. There was really no precedent with regard to the snow load problem which Glacier would face.

But with regard to a lot of men and camps with a lot of food and bear problems, they had them all. It was out of that milieu that these bear-proof or relatively bear -- highly bear repellent -- better than bear-proof. They always find a way to baffle somewhat the best design. These are good. They will go several years without penetration.

At any rate some of the other problems that they encountered there are worth mentioning. These were related to the workers themselves in trying to maintain a degree of control over what the workers did in their off hours. One of

(Herrero)

the most persistent problems that occurred was workers who would bait bears or go out in some way looking for pictures or thrills or to commit suicide or what, I have no idea, but there were persistent problems which were caused by virtue of workers' off hour activity attracting bears for one reason or another or interacting with bears for one reason or another. On TAPS they found that it was not sufficient to simply fire the workers, which they did. It was policy that any worker doing that would have to be fired. It was not sufficient because they could move to another camp somewhere far enough away that I guess the record transfer was not complete enough, and the worker would be hired back. Eventually they implemented a policy whereby not only the worker would be fired, but the foreman would be fired as well if one of his workers was convicted of baiting bears.

Now, I do not know how they ever got that through the union, but that is probably the most marvelous thing about the whole affair.

At any rate, the workers themselves, in their activites not related to construction, are a problem which requires a serious degree of management, and that has to be worked out with union regulations and has to be made feasible and humane and everything else and I identify the problem and suggest some of the solutions which worked in

(Herrero)

Alaska. But it is something that is worth mentioning and worth underlining.

Finally, I think I would like to mention the sort of overall integrated system that I saw if the camps were to be constructed in the Park. Ideally I would like to see it implemented if the camps were constructed outside of the Park, but the realities are such that much tighter environmental management regulations, it is my understanding, will be implemented if the camps are in the Park versus if they are outside of the Park because the Province of B.C. is not nearly as strict in its requirements for environmental management or at least with regard to bears as is Parks Canada.

The final problem that I want to identify and just briefly comment on is there is sort of overall management and implementation of the whole system. There is an environmental manager who is sitting over there, Mike McKnight, attached to the project who would certainly have primary responsibility seeing that the fence was turned on at the right moment, that the gates were not left open, that the garbage was not blowing outside of the fence, that workers were not baiting bears and all these myriad of other factors.

But I did propose in my report that a team of people who had experience in managing camps and managing problems in bear country also

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(Herrero)

be established to assist Mr. McKnight in the inspection and to sort of identify problems at least as they start if not before they start. You know, once the camp was designed or in the process of the camp design to take a look at the management of the kitchen and to take a look at the management of the fence, because it is one thing to build a fence; it is another thing to properly manage it. It is one thing to have workers there, another thing to have some degree of control over off hour activities. These camp locations are indeed in good quality bear habitat with a lot of bears around, so the potential for problems is a very real one.

I am at the same time sensitive to the comments which I think I just came in on the tail end which Mr. Fox has made, that perhaps C.P.R. is being forced to perform to much higher standards than other operations have, and I think the experience of the Northlander and Parks Canada themselves, to the extent that they are in analogous situations is somewhat of a guideline.

I do think it is possible with a full perimeter fence to maintain a bear-proof camp, but it would require a lot of focus and follow-through.

Now, what would happen if these camps were just put there without any fence whatsoever,

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(Herrero)

or with a partial fence is I think a very likely series of bear-related problems. How serious they would be would depend on how serious the opportunities were for bears to prowl through camp or to be attracted by odours which led them to something to eat. Odours by themselves do not do much, they are merely an attractant. If there is not something to eat that follows, then the bears quickly learn to go away. So complete sanitation or complete isolation of bears and garbage is important.

But I was concerned, and I indicated this to the C.P.R. that the partial fencing solutions, largely because the camps are built right against the edge of the forest, which from the environmental point of view is probably a good choice because it makes maximum utilization of the site, but the bears also make maximum utilization of the forest so that they have an ideal situation to approach from. They will use the forest right to the edge of the camp as cover, both species, and will approach much more readily than if the camps were in the middle of a huge open area. This is especially true of black bears which are more reluctant to leave the forest than are grizzly bears.

So the partial fencing solutions, while they might do a really good job of isolating garbage from bears, they might not, too, if workers, I do not know, go into town and buy snacks and throw

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(Herrero)

things out the window or sit around outside eating and throw things: I do not know how that would work. But at any rate, there might be bears exploring through camp just because of the fact that the cover comes up to the edge of the camp. At any rate, the potential danger that is there would be probabilistically very slight, and I suppose could be traded off against the cost of full perimeter fencing versus partial fencing.

I think what I would say by way of summary of my thoughts on camps potentially being located in the Park, in summary, I think there is potentially a feasible technology to keep bears out of these camps and it would require all of the enabling mechanisms to make it work, and it would require answering the questions of snow removal,which would be essential for the function of the fence. At the same time, I do not comment and have not commented from a Parks point of view whether it would be desirable or from C.P.R. point of view whether it would be desirable to have the camps inside or outside of the park.

MR. FOX: Thank you, Mr. Herrero. I would also like to ask Mr. Jack O'Neill to say a few words to the Panel on camp operation. Mr. O'Neill is Chairman of National Caterers Limited, a Vancouver firm and he has been operating camps I might say all through British Columbia and

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northern Alberta for the past 23 years, and I am sure perhaps he can enlighten us on what camps are and how they can be operated and what you have to do. Mr. O'Neill.

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(O'Neill)

MR. JACK O'NEILL (National Caterers Limited): Thank you, Mr. Fox.

Mr. Chairman, Board, ladies and gentlemen, National Caterers is not just a catering company. It is what we call a turnkey company. We have three or four different arms within the company, and since 1962 we have been installing the complete camp with our own trailer fleet, our own construction arm and naturally do the feeding after this camp is installed.

In the case of many of our installations, we start right off the bat working with the environmental people, working with the water resources, planning the site and the source of the water which is quite important, and then we go about clearing the site, bringing the equipment in to lay out the utilidor, the light plants, bringing in the trailers and then, as I say, eventually feeding.

At the end of the project, through agreement with whichever regulatory body it is and however they would like it, we have even turned camps into air strips, replanted them and as you can see, those are some of the camps that we have installed since 1962 in Alberta and B.C. We do have the pleasure of installing and feeding about 95 percent of the pipeline projects in Canada. I guess we did about 80 percent of the transmission line. We

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(O'Neill)

did 100 percent of the B.C. Railway construction and all their camps and we are presently doing a number of large installations and running them, managing them and managing the environmental, everywhere from Quintet where we have sort of a maintenance and we do every bit of maintenance on the Quintet crow project from the buses to running the sewage treatment plants to installing you name it, and even the warehousing, doing the truck repair. So we cover all phases, not just feeding, and we have been doing that, as I say, since 1962.

The subject of bear and bear control I know is a bit of a touchy item. We have had and have been located in I suppose any place that there are bears, from national parks to swan hills to far north to the B.C.R. where we had any number of bears, and the complete, in my mind, secret or answer to bear control is the control of your garbage and removing that garbage far enough away from the camp so that there will be no attraction.

Compounded with the problem of the garbage dump are the odours around a kitchen that you eliminate. In looking at the problem in the parks, we would propose bear-proofing, which is metal lining under the floor of the storage and garbage area and electrifying the perimeter on the loading zones and in the garbage storage area. What it would be is a garbage compactor. Now, these

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(O'Neill)

are proven and as a matter of fact, I see one about every three weeks at Whisler. They had bear problems in two of their dumps. They tried everything. They finally have settled on an electrically controlled, you open up heavy plate doors and you dump in your garbage. Immediately that activates the motor which moves the garbage along, compacts it and puts it into another area. Then we would be unloading that probably twice a day, but bears just cannot -- it is thick plate steel; they just cannot get anywhere near it. So even if they came up to it, they do not have a lunch and you keep it well disinfected with Pinesol and mothballs and things. That just throws them right off the scent.

We truthfully have had very -- it goes back many years that we have had any bear problems even around the back of the kitchen. The back of the kitchen is where the bears go. In the operation of a camp, cleanliness is number one; the grounds, the bunkhouses, the rec hall and the kitchen, and the removal of the garbage from the site on, you might say, a twice daily or at least a daily situation.

We would certainly plan on working with the Parks people and having them direct us to where they would like us to dump both the garbage and the snow, and certainly we would form committees not only on fire patrol, as we usually do, but

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(O'Neill)

certainly on inspection and the control and implementation of the rules controlling, as was discussed, feeding of bears, petting of bears or having them as pets as I have heard happen. So it is really an overall controlled camp, controlled garbage situation, controlled egress and ingress of food stuffs. I think that problem -- a bear fence I have not viewed, but I think this is a doubly -- it will solve the problem twice over with the container by itself, then surrounding your whole food area, service area with an electrified fence.

MR. FOX: Thank you very much, Mr. O'Neill. Mr. Chairman, we have looked, as you can see, very thoroughly into this matter and we have not reached our conclusion very lightly.

One of the problems that we really have, and I certainly respect Dr. Herrero's advice, and he alluded to the problems of snow, and this is a very serious problem. With the amount of snow that we get in the Glacier National Park area, I am sure heat trace in setting concrete would not nearly be sufficient to melt the snow that we get in that area. I think all we would end up with is an iced up tunnel with the snow above it, and the only sure way, if we are going to keep the fence the year round around the camp, the only sure way to remove snow is to do it mechanically.

That would require sufficient room

outside of the fence to operate such things as frontend loaders or a snowblower and have a place to place the snow. This, of course, would require, in the sites that we are looking at, removal of a 30 foot fringe of trees.

Now, that is our dilemma. If we are allowed to go into the Parks with our camps and we are forced to put up bear-proof fences which I would do rather than have people subjected to bear attacks or anything like that, but I would have to have sufficient room beyond the fence to be able to fully maintain that fence year round.

So, the alternative to that is, as Mr. O'Neill has described and I described it myself, and I fully realize that fencing your garbage and your food areas does not protect the man from the bear, as Dr. Herrero has suggested and recommended.

However, whichever way we go, I still want the camps in the Park for the reasons that I have outlined, and I see no reason why any company should be put to an expense of the order of $30 to $40 million due to additional travel time over a four year period because somebody figures that the camp might be a nuisance. Now, I have got to have a better reason than that to go to my management and the people of this country and say, hey, you are going to have to anti up another $40 million in freight charges because. I will leave that with you.

Having said all that, that is our camp presentation and we are certainly open to any questions and any suggestions too.

THE CHAIRMAN: I think we will be getting to you with questions, but I think this quite naturally leads into Parks Canada, and I do not know whether you prepared a presentation, but I think at the minimum I think we would be hearing from you your reasons for not wishing to have the camps in the Park, if I understand that to be your position.

(Leeson)

DR. BRUCE LEESON (Parks Canada): We made our first indication to C.P. Rail that we did not want the camps in the Park in April. That was following nearly a year of discussions and research and investigations about camps being in the Parks, which began at your hearings a year ago now.

At that time, we were equivocable about it and we were somewhat surprised to hear so many people comment at the hearings and to us afterwards that they thought camps in the Park were a bad idea. So we determined that we had better be more cautious about the whole concept, and suggested to C.P. Rail that they should investigate the issue very thoroughly because there were a lot of points to be attended to.

They did so and have reported tonight about their research, and we think the research has been well done with regards to the wildlife, at least, that is reported in this document. It is determined that there is probably not a caribou problem and we agree with that. It is determined that there would be a bear problem and we agree with that.

Now, Dr. Herrero has done a commendable job, we think, of investigating what the nature of the problem might be in terms of similarity with other camps in the Interior mountains of British Columbia.

(Leeson)

When we read the solution, it was quite alarming, of course. The treatment proposed to keep bears away that Dr. Herrero describes in his report we think would be very effective, probably the most effective we have ever seen. I suspect you have read and others may have too that it requires substantial impact on the Park, in addition to the fence, which would have to be protected by snow and requires the 30 foot strip around the outside and inside too, I suppose.

It is also proposed that a 300 metre, that is approximately 1,000 feet cleared zone outside of the fence would also be required. Well, that greatly enlarges the impact on the Park that the camp would constitute. That is very alarming for us because the sites were probably very minimal to start with. It would require a really cramped camp, and at that time we were talking about two camps for 250 men each.

So with that information at hand and other things that we had seen at other camps and other information that we had received about camps, we concluded that we could not endorse the camps in minutes of our April meeting with C.P. Rail and we stated the following, that substantiated our request that they withdraw their proposal to put the camps in the Park.

First we said that the camps would

(Leeson)

not contribute to the short term preservation, understanding or interpretation of Glacier National Park. Any object, any activity that is proposed on national parkland has to be judged against those criteria because that is our business, that is what we do; we provide understanding of what is being preserved and we provide interpretation, and the camps contribute to none of that. As a matter of fact, they detract from all of that.

Secondly, we said that the camps would cause short term destruction to visitor activities and create environmental impact. We thought that the disturbed areas being proposed for the camps were insufficient and substantial expansion would be implied.

Thirdly, the camps provided no short term or redeeming residual merits to promote their presence in Glacier National Park. There was nothing that the camps could give to Glacier Park, either for the visitors or for the operation, either in the short term or in the long term.

So with that information provided to C.P. Rail, we said that when the hearings were coming up we intended to oppose the camps and we so advised you in our first communication with you.

We are doing this on this basis, that this Panel and this group has been called for people and for you to identify opportunities to

avoid impact on Glacier National Park as a result of this project which is deemed necessary and for people to suggest alternatives. We have alternatives to suggest. Where we did not look through railway, there was no alternative; it could not go anywhere else. There is an alternative for the camps and to the west, a large cleared area adjacent to the Trans Canada Highway and to the railway tracks and water exists approximately six minutes driving west of Flat Creek, nine kilometers west of Flat Creek.

It is a site about ten times as large as Flat Creek. It has been subjected to industrial activity and would be available, we think, as an alternate to Flat Creek. For the east camp, that is the Beaver River Valley camp, east of the Park there are many clear cut areas available. All have access to them. The best ones have water available and they have very large areas where the bear defences that have been proposed could be implemented without any clearing and also the west site could too.

(Leeson)

So on that basis we are here to say that we think the camps represent an intrusion in the Park. They are contrary to National Parks policy. They are contrary to National Park plan for Glacier Park. There is an alternative. We have identified what the alternative is and we are suggesting that this Panel consider that and we are asking, in conclusion, therefore, that the camps not be permitted in the Park.

THE CHAIRMAN: Okay, I think that is clear enough as a position statement. Thank you.

I have a question to start off the questioning and this is the control of the workers. Somebody mentioned, I believe, it was Steve Herrero, the Draconian measures that we used in the TAPS projects in order to deal with conflicts. I would like to pose a hypothetical situation. If a camp was in the Park and there were problems, how could Parks deal with these problems? If you had somebody causing problems facing a bear or something lesser than that, what measures would you have for dealing with that individual if the camp was in the Park? What could you do? Could you ask him to leave the Park entirely or would you have to go and see C.P. and say this individual was just causing a problem.

DR. LEESON: That is completely to ourselves. Our only option is to use the

National Parks Act to charge somebody who is actually interfering with wildlife -- they are feeding it or harrassing it in some way. Now I would expect that there would be an agreement with C. P. Rail and they have stated their preparedness to deal severely with an employee who would be harrassing wildlife, whether they were in the camp outside or in the Park.

THE CHAIRMAN: Does C. P. have any comment on that question?

MR. FOX: I would think along the same lines as Doctor Leeson has suggested, but I would suggest that one thing would have to be done and that was you would have to very definitely ensure that you could identify the individual, and I would suggest that under the powers of the Act that govern the National Parks, the first step you should do is place that guy under arrest, if that is what you can do, and then you have got him, and then march him in and take all the necessary particulars, and then we could deal with him on a proper basis. But if you think somebody has done it and you have not got his name, you have not got a case. You have to have a good case before you can get it through the unions.

THE CHAIRMAN: It seems to come down to the question that Parks may be losing some control by having work camps in the area, whereas

presumably with campers if you were having problems, you can ask them to leave fairly easily.

DR. LEESON: If the infraction was not a really serious one, for example: somebody was picnicking and there was a sign that bears were in the area and they left their picnic site unattended and covered with food, they would likely simply be verbally reprimanded and directed to clean up. In recent years, people have actually been apprehended throwing bran muffins and things -- I mention that because it is one I think of to bears, and they were charged and taken to court and last year the fines were in the order of $300 to $500. I can only remember one instance where somebody was actually arrested for being involved with a bear and that was about four years ago on the Icefield Park where a bear approached a man's picnic site and he whipped out his 44 magnum and killed the bear right on the spot. So he was arrested.

THE CHAIRMAN: Panel do you have any questions?

MR. TENCH: Doctor Leeson, these two camp locations outside the Park would put 400 people within easy range of the Park from either end, and I would suggest that the social impact of this would be possibly as great as having them inside the Park with regard to abuse of Park facilities, and maybe more so, because if these

campsites were outside, the cars probably would also be parked there, which would make that whole workforce probably far more violent with regard to use or access to the Park facilities. Have you given this any thought?

DOCTOR LEESON: Yes, we have, and I do not disagree with you, Mr. Tench, that simply having the camp two kilometers outside the boundary is going to do very much to alleviate the social concerns that exist. We are not imagining that there are substantial social benefits by being outside of the Park, except on the east end probably there would be because then there would be likely a fairly strong attraction to go to Golden for recreation, and so the east-end workers may not use Park facilities too much, but on the west-end, it likely would not make very much difference.

MR. TENCH: The putting of the camp in the Beaver Pit would not likely damage the physical facilities of the Park at all, I think. At least, that would be my feeling.

DOCTOR LEESON: Did you get to the Pit to see it the other day?

MR. TENCH: Yes.

DOCTOR LEESON: Probably it is insufficient in size for a camp -- I think that is the 460-man camp, and last Thursday we learned that the camps were not 250 men camps. They were

420 and 460 men. So they are substantially larger than we had known about before.

If we go with the Cadillac bear system, protection system, then we have a 1000-foot cleared area outside the fence, which clearly is very large compared to the size of the areas available.

Is anything less than that acceptable? Well, we do not know. Perhaps Doctor Herrero could comment on that, the degree to which the bear protection could be cut down and not jeopardized its continued capability to defend against bears. We were also, I must hasten to add, skeptical -- I think that is the proper word to use, about a no-parking. We visited the camp at Revelstoke Dam and the parking is approximately as large as all of the rest of the camp. The camp manager told us that almost every man in the camp had a car there and that was important to them -- single men, married men; it did not matter who they were. They usually did not stay more than three or four days in camp before they left for some reason or another, and they use their cars, and we wonder whether a situation might come to pass where we would plan not to have cars; camps would be installed accordingly and nobody would come to work. The trade unions,which you must know are extremely strong in British Columbia, may not agree. Then what would we do?

THE CHAIRMAN: I do believe that in your presentation you mentioned that something would require the cooperation of the unions.

MR. FOX: Right, you certainly have to get the union agreement to the no-parking set-up within the Park and a common pick-up either in Revelstoke or Golden or both.

THE CHAIRMAN: Have you talked to the unions at all?

MR. FOX: No, I have not, not yet.

MR. TENCH: Do you think it is feasible to keep these 400 men in one camp location and really not let them out? Am I seeing the right scene there that they come in four or five days or whatever the length of the shifting is before they are allowed out?

It strikes me as a sort of a prison sentence while they are there.

MR. FOX: That is not the intent at all, Doctor Tench. I think if you look at my remarks and the general comments that I have made for the last two nights, you see I suggested that there would be trips into town during the course of the week -- that would have to be provided.

DOCTOR HERRERO: I would like to clarify what I did say in the report with regard to the desirability of clearing the perimeter around the fence. The recommendation was based on some known behavioural characteristics of black

bears that they are reluctant to cross open areas. They will cross them especially under cover of dark. They are reluctant to, and the ideal situation if you want to locate a camp, especially in black bear area -- it helps also in grizzly bear area, is to have a cleared perimeter around the outside of the camp and it sets up a situation where bears are more reluctant to approach.

I suggested that the ideal with that in mind might be 300 meters. I went on to say that 200 meters would do it and even 100 meters would probably get substantial benefit.

The design that is being proposed if the full perimeter fence were implemented would pretty well have the fence up against the forest. Now if the fence is properly maintained and the snow loading problems are handled, and the fence is built to the highest specifications, there should still be no problem with bears.

It is just -- the reason I recommended the cleared perimeter was just another aspect of this sort of back-up system, just to make it more difficult for bears to approach, but it would not affect the overall function of the fence in any way. If the fence is doing its job, as my colleagues have convinced me it should, then the fact that the fence is right up against the forest should not matter provided that the snow be cleared.

Now Mr. Fox has thrown out the more realistic figure perhaps of 30 feet needed in order to clear the snow, and again, I am not an expert in snow removal, but I do know that it could be the most serious problem that this fence would face. The 300 meters, with due respect Bruce, was recommended as another one of those sort of ideals and back-up systems, but it is not an essential component of the design, but, however, if the cars were located in a large clear-cut outside of the Park, then there would be less cover for bears to approach.

THE CHAIRMAN: I would like in a second to provide an opportunity to the M.P.P.A.C. representative to make a presentation and maybe we can come back to the wildlife issue.

The one question that I would have at this time before we go into that is that it seems to me to some extent the feasibility of work camps is dependent on the attitude of somebody that is not here and that is the union in terms of parking, and accepting the fact that people would not be allowed to have automobiles. How difficult would it be for you to get some sort of understanding with the union and inform the Panel of what understanding you have with them?

MR. FOX: Well, let me ask this question so I can go to them on an honest basis.

Can I have parking? If the camps are in the park, can I have sufficient room to park the cars or can I not? That is the issue. If you tell me I cannot, then I have something to go to the union with. Right now I base all my assumptions on the fact that we have limited room, and limited room eliminates parking -- no room for cars.

Now is there any other place in these areas in the Park assuming -- say if we got the camps in the Park, can we have the workers' cars in the Park? Is there room some place for them? You know I have scratched my head and gone and visited sites and I am at a loss to do any more thinking on this thing.

THE CHAIRMAN: I suppose ultimately you could also put them outside the Park with a schuttle service if it came to that?

MR. FOX: Well, you go to the union on that too.

THE CHAIRMAN: Well, I thought the message was fairly clear from Parks in terms of we do not want the camps, so I assume they do not want the cars.

MR. FOX: The answer then, as I understand it, under no circumstances will there be any parking in the Park if we had the camps in there. Is that a correct assumption on my part?

DOCTOR LEESON: That is right - we do not want the camps and we do not want the cars.

MR. FOX: So even if we had the camps, you would not want the cars because there is no room for them. Would that be a correct statement?

DOCTOR LEESON: That is correct.

MR. FOX: That would be a correct statement. Okay, so all I have to do then is go to the union and I tell them that Parks Canada will not permit any parking of private vehicles within the Park boundary, therefore, we will propose this and they will not have a leg to stand on. Now there is all kinds of camps where that particular rule is invoked and if you would like to hear some Mr. O'Neill will tell you some.

THE CHAIRMAN: That explains it fair enough. You feel that if that position was taken that would be an absolute --

MR. FOX: It is outside of my hands. You know, I am completely cut off and I cannot do a thing about it. I have just been told there is no parking. I have to respect that, regardless of what the union might want.

THE CHAIRMAN: Okay, fair enough. If we could have the representative from M.P.P.A.C. perhaps come up to make the presentation, and I understand that you have a time constraint, so now might be a good time to come forward and make your presentation.

MR. DON COCKERTON, National & Provincial Parks Association of Canada:

Thank you, Mr. Chairman. Ladies and Gentlemen: My name is Don Cockerton. I am speaking here for Kevin McNamee who is the National Program Director in Ottawa for the National & Provincial Parks Association, and I think if there are substantive comments or questions, I shall do my best to answer them, but some may have to be referred to him for a response.

Glacier National Park and Rogers Pass are spectacular monuments that attest to the awesome power and beauty of nature. The environmental effects of C.P. Rail's project to twin the existing railway track through Rogers Pass, however, will demonstrate the fragility of this mountain environment for years to come. The range of concerns, the amount of information and the number of documents before us is a testament to the enormous scale and widespread implications of this project.

The National and Provincial Parks Association represents the views of some 2,000 Canadians. We firmly believe that Glacier National Park should remain primarily representative of our natural heritage, not of man's attempt to dominate nature. Our primary concern is that this project should not compromise the integrity of a national

(Cockerton)

park that will celebrate its centennial in only a few short years. Our Association welcomes the opportunity to appear before this Panel and offer our views on C. P. Rail's project.

The Association acknowledges and is pleased with the work of this Panel and of the various steering, environmental and design committees in trying to develop and implement strong mitigative measures. This work is absolutely essential if the impacts of this project are to be less severe than anticipated. It is apparent that from the time the Canadian Transport Commission approved C. P. Rail's application, progress has been made in addressing the environmental implications of this massive undertaking. C. P. Rail is to be commended for the way in which it has seriously addressed the concerns of the Panel, Parks Canada, and citizens groups such as ours. It is our understanding that design changes, such as the location of the ventilation shaft, have been invoked to meet stated concerns. We are pleased and hope that this is a reflection of an ongoing commitment by C. P. Rail to use sound environmental engineering practices in the alteration of Rogers Pass.

The Association has a number of comments and concerns which we hope will be constructive and serve to remind those involved that we are discussing the permanent alteration of an

(Cockerton)

part of our national heritage - Glacier National Park.

The first area of concern is Terrain Impact. A major concern of the Association relates to the extent and number of large scars and subsequent erosion of these scars as a result of this project. It is the expressed feeling of Parks Canada that slope stability may be more problematic than anticipated. While C. P. Rail's report of June 1983 describes its reclamation program in some detail, measures to prevent slope failures and erosion have not been discussed at length. There has already been one landslide as a direct result of construction. Furthermore, Mr. David G. Walker, in his letter to the Panel of May 16th stated that there was "an unacceptable level of surface erosion", erosion control could be improved at major stream crossings, and that there were slope stability problems west of Stoney Creek. Can C. P. Rail provide us with assurances that proper and effective action will be taken to prevent or mitigate such slope failures that have already occurred?

The second area of concern is the Construction Schedule. It is our understanding that the $600 million plus cost of this formidable undertaking is to be financed by the proposed increase to the Crow Rate. As all are aware, political action on this issue has been slow and no solution

(Cockerton)

appears to be forthcoming. Our concern is that if a change in the Crow Rate is delayed for a long period, the pre-construction work will sit and fuether slope failures may occur resulting in a number of insightly scars and impacts. Our question to C. P. Rail is are they committed and prepared to maintain the integrity of the construction area even if construction may be delayed? This is an important point and should be addressed by both C. P. Rail and the Panel.

The third area of concern is that of Visual Impact Assessment. We find the Visual Impact Assessment study deficient in a number of areas. The study was limited to evaluating the visual impacts of the project on users of the Trans Canada highway. While the authors acknowledged the fact that many trails exist in the park and around Glacier House which attract climbers and hikers from around the world, no attention was paid to the visual impact on trail users. What are the implications of this project on backcountry users?

Many assumptions have been made about how visitors perceive the Park as it presently exists and how the project will be viewed. Upon what evidence have the authors drawn to make their conclusions?

The monitoring program referred to by the authors and C. P. Rail in its June, 1983 document is not to be found. While mention is later

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made by C. P. Rail of a monitoring program on page L06,the monitoring is only periodic. Are 14 site visits by the landscape architect sufficient?

Finally, the report seems to under-estimate the size of the cuts and fills. While early indications were that they were to be confined to 200 feet, we find discussion of cuts that are almost 600 feet.

The fourth area of concern is that of Work Camps. Parks Canada has requested C. P. Rail to withdraw their proposal to locate work camps within Glacier National Park. The Association strongly supports Parks Canada in its position. National Parks are established to:

(1) protect and manage the natural environment and also

(2) provide outdoor recreation opportunities as a means to understand and enjoy heritage resources.

The establishment of work camps within the Park are clearly contravening this policy. We do not accept the position that work camps of the size proposed, located in the Park for at least four years, will not attract bears. Furthermore, despite the recommendations of Doctor Stephen Herrero, based on his work as submitted to C. P. Rail, C.P. Rail has decided not to adopt his recommendations on economic grounds. I might say that based on what I have heard earlier this

(Cockerton)

evening that may not be quite an accurate representation.

It is our opinion that C. P. Rail is proposing a situation here where a number of contacts between workers and bears will be possibly fatal to both. Ultimately, a number of grizzly and black bears would be destroyed.

Also, while the discussion has focused on the interaction of bears and workers, no attention has been paid to the possible problem that bears attracted by the camps will have an impact on park visitors and backcountry users. In short, the cumulative effects of site disturbance, loss of park facilities, aesthetics, social problems, wildlife conflicts, and other environmental problems lead us to believe the work camps should be outside the Park.

On the economic aspects,why is C. P. Rail paying double-time for travel? Why should the Park be penalized for conditions that exist between C. P. Rail and the unions?

In conclusion, we congratulate all involved for the establishment and use of the committee system. It is our understanding that they have been effective in the decision-making process. We strongly urge that these committees and that members participate fully so as to ensure the proper design and construction of this important railway corridor as well as the prevention and

(Cockerton)

mitigation of impacts.

Finally, the National and Provincial Parks Association fully acknowledges the fact that the Canadian Pacific Railway has been a part of the visual and cultural heritage of Glacier National Park for the past 100 years. We have no doubt that future generations will view the construction that will occur at Rogers Pass in awe. But C. P. Rail must view Rogers Pass and the twinning of the rails in its proper perspective: the primary reason for establishing a national park here was the scenic and beautiful landscapes.

Environmentally sensitive management techniques will no impress the public, nor will people stare in awe at this railway corridor if large slope failures, eroded hillsides and polluted rivers scar the landscape when the project is completed. The public will know these scars are the result of a poorly constructed railway.

The authors of the Visual Impact Assessment are confident that people will view this project as a wondrous undertaking. We do not share their optimism.

The task ahead is difficult. We realize that all the damages cannot be predicted, nor fully mitigated. Frankly, though, we would find it somewhat reassuring if C. P. Rail stated that it will commit the time, the resources and the money to reclaiming Rogers Pass on a scale

(Cockerton)

that is similar to the effort that they are placing into the construction phase of this project. Thank you.

THE CHAIRMAN: Panel, do you have any questions?

DR. ROSS: Mr. Cockerton, you mentioned or I guess questioned whether the 14 site visits by the landscape architect would be sufficient. Are you suggesting that more are necessary; that continuous presence of a landscape architect or reclamation consultant or inspector are required?

MR. COCKERTON: I have to assume that what was meant by the remark is that a given number of site visits would probably not in itself be adequate. Perhaps it was the only reference found by Mr. McNamee to the kind of monitoring measures that C. P. Rail had proposed to ensure that visual management techniques were effectively applied during the construction period.

THE CHAIRMAN: C. P. Rail do you have any questions you wish to ask?

MR. FOX: I would just like to ask the gentleman what is your professional background?

MR. COCKERTON: My professional background presently is as a recreation planner.

MR. FOX: Thank you very much. No further questions.

THE CHAIRMAN: Parks Canada?

DOCTOR LEESON: No questions.

THE CHAIRMAN: Do any members of the audience have any questions on this presentation? -- If not, I think at this point I would like to thank you for coming along to make presentation on behalf of the M.P.P.A.C., and I think that this time might be appropriate to call a break and have some coffee before we get back to the issue of camps.

---Brief adjournment.

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---Upon Resuming

THE CHAIRMAN: If we can all take our seats again, please, we will reconvene.

I have short announcements here, one of which is that there is an overlay apparently being prepared of the area of the works camps, has been prepared, and it is available for people to see at the back of the hall when you want to.

We are going to go back to the work camps again where we left off. One thing I would like to clarify and get on the record. Mr. Tikkanen from CTC, I wonder if you could inform us concerning the existing right-of-way that Parks or that C.P. has as to if there are any deviations from the 200 feet or 275 or wherever they have it, what is required? As I understand it, that is an approved book of reference by the CTC and that CTC would have to approve any changes.

MR. KEN C. TIKKANEN (Canadian Transport Commission): That is quite right. Mr. Chairman. The CTC approval has been given to specific planned profile book of reference, and if there is any deviation from that then there would have to be a reapplication by the railway.

THE CHAIRMAN: I presume you would not have to go through a whole hearing process again? You would just ask the various parties if they were in agreement?

MR. TIKKANEN: Exactly.

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THE CHAIRMAN: I guess, then, we will go back to work camps, and Panel, do you have any further questions you would like to ask? Bill Ross.

DR. ROSS: I guess this question is for Mr. Fox or Mr. O'Neill. It deals with the odour problem. I was not sure what your odour control mechanism proposed was, Mr. Fox. In particular, I was inquiring about whether you were planning to use any fume incinerators?

MR. O'NEILL: The control of the odours would be two-fold. We would be putting charcoal scrubbers on the food that comes from the cooking area and it has been recommended to vent higher the stacks, then you would be putting a larger horse-power motor on the stack to throw the air up.

Around the garbage area, which is common, is very heavily Pinesolled and mothballed. Not everybody uses mothballs. I am not sure how many people know, but I swear by them, even in my own back yard, to be truthful I have bears.

DR. ROSS: That is one of your own secrets, is it?

MR. O'NEILL: Yes. So really, those odours of cooking do not draw in anywhere near as much as the garbage odour. That is the odour that if it is not controlled is the problem.

DR. ROSS: I see. Dr. Herrero, I guess you made reference to a team of bear experts.

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Sorry, a team of experts dealing with bear problems -- let me ask a different question.

Monitoring. Presumably you would expect that a difficulty such as this would have a monitoring component of it, whether that team of experts would be involved or not. What would likely consist of an appropriate monitoring program and an evaluation program?

DR. HERRERO: First of all, I would underline what you have just said. I think monitoring would be a very important component of it because this is one of those areas where you can only so, I think, anticipate 70 or 80 or perhaps 90 percent of the problems, but some of them have to be responded to as they develop. Perhaps, let us say, ingress and egress from the gate. If a full perimeter fence is not adopted, then there are, I would see problems of controlling ingress and egress and making sure the gates are closed and things. That is just an example of a minor problem which can have major consequences for bears or people if it is not attended to.

Now, most of these situations I would imagine the environmental coordinator would be on top of. He has a background and history in dealing with bear problems in parks, but there are certain situations, perhaps at the design phase or in the redesign or retuning of the fencing that I think having the expert advice of people who have

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worked with similar situations and worked with bears for a number of years would probably be desirable. So I think the day-to-day monitoring is certainly the responsibility of the environmental coordinator.

However, I think the desirability of having a team of experts familiar with these problems who look at it maybe two or three times in the design phase as it starts to go to working drawings and then look at the camp a couple or three times a year, especially if problems are developing but perhaps even more so to keep them from developing, that is what I had in mind.

DR. ROSS: I guess that leads me to the next question which is to seek your best professional judgement on the difference between the full fencing and the partial fencing proposed in the red book here. I assume from your original report you would recommend the full fencing and you indicated that you were unsure, if I understood you correctly, of the likely success of the partial fencing. Have you got anything more that you would care to elaborate on that difference?

DR. HERRERO: Thanks. There are several factors which make me still and perhaps even more strongly so favour the full perimeter fencing if the camps -- well, I would favour it no matter where the camps are built, but especially if they are built in the Park site locations, I strongly

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favour it, and that is because the camps will, as I have previously said and Mr. Fox has previously said, pretty well make use of the available site so that there really will not be a cleared perimeter around the outside of the camp.

Now, this means that bears can use the forest as cover and approach closely to the camps. From there, it is only a matter of 30 feet at the most. Let us say the 30 foot perimeter is maintained for snow clearance, it is a matter of 30 feet for a bear to come in and explore the camp. Now, if worse comes to worse, and I am sure it would be worse to worse, and you know, a worker throws a sandwich out the window or they are sitting around drinking beer one afternoon and they leave a couple of bag of cheesitz out and grizzly bear happens to come into camp and a worker happens to go out that night and bump into it, it could lead to a serious injury; it could lead to a minor injury as well.

But the full perimeter fence precludes that possibility of occurring within the perimeter and one of the principles I have come to feel is very, very important, over the years in sort of designing areas fo r bears and people is that campgrounds really ought to be, or camping areas or living areas really ought to be areas for people, not areas where people and bears are mixed up.

The advantage of the full perimeter fence is there is no uncertainty as to whose territory

is whose. Outside the fence it is the bears; inside it is the peoples. Even though the design of the camp has corridors, enclosed corridors which the workers could pass through, I still suspect they would spend enough time outside that, you know, some food or garbage could accumulate and workers would walk around the camp and would assume it is their area but that would not necessarily be true.

With the full perimeter fence it would be true.

THE CHAIRMAN: If I could follow up on that, I believe that part of Mr. Fox's argument was that he felt that by putting a fence up, a full perimeter fence it would be treating that work area differently from other areas in the Park, and maybe you could tell me why you think that a campsite area is different as opposed to a campsite where people are pulling up with their tents and possibly leaving out their cheese sandwiches or whatever? Is it because those sites are particularly grizzly bear habitat as opposed to the campsites that tourists use? What is the difference between the two sites that requires a full perimeter fence?

DR. HERRERO: I suppose the first thing that brought it to my mind was the magnitude of the operation. At the time I had assumed that it was for 250 people and now we know it is for over 400 people. The intensity of the operation and the amount of food and throughput of food and garbage

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is quite substantial. I frankly do not know the extent to which other large campgrounds such as Illecillewaet, the number of people there and the volume and throughput of garbage, I know in general Glacier has managed its garbage very well. They have bear-proof storage of garbage and they seem to be able to convey the message to people to keep their food under good storage. Glacier has not had many problems with bears in campsites.

As you go out to the east and down into the black bear areas more, there have been a lot more black bear problems, however, in campsites there, and I am not sure what has happened to the west. I am not familiar with the camping areas that are there.

But I am not sure to the extent to which the situations are analogous and when I say I am not sure, I am not sure, and I regard it as an important question. It may be that the volume of garbage and food handled and processed by the C.P.R. camps is analogous to a similar campground. I do not think so. I think the C.P.R. camps are a bit more substantial.

There is no question in my mind in both situations, though, that the overall population densities of both species of bears, both black and grizzly bear in Glacier Park as a whole with some areas being favoured by grizzly bear, for example, around Flat Creek in the potential Glacier campsite,

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and other areas being more favoured by black bear down around Beaver camp, but there is no question in my mind that the potential for bear problems exist in all these operations because the density of bears is a relatively high one.

So I am not sure if C.P.R. -- you know, it seems to me to be a potentially important argument that they may be being forced if the camps were in the Park to perform to much higher standards, and I think it would require a more careful look and a more detailed understanding of the current operations at the Northlander for Parks Canada and the various campgrounds than I have right now to be able to evaluate that argument.

THE CHAIRMAN: Do Parks have anything they want to add to that question that I put out?

MR. TENCH: Does anyone know what does happen at the Northlander that will give us an idea of how they treat their garbage and how they protect things there?

MR. GALLACHER: We take care of their garbage, as we do their whole camp, and we have not had any difficulty whatsoever and we do not have fences.

DR. HERRERO: How do they store their garbage?

MR. GALLACHER: It is stored in containers, above ground containers and we remove

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the garbage once daily.

DR. HERRERO: These are bear-proof containers?

MR. GALLACHER: That is correct.

DR. HERRERO: And there is no history whatsoever of any bears being captured at those sites?

MR. GALLACHER: None to any great extent.

DR. HERRERO: Does that mean there is some then?

MR. GALLACHER: There are some, yes.

DR. HERRERO: Thank you.

MR. GALLACHER: But that is operated 365 days a year, 24 hours a day during the winter months.

DR. ROSS: I guess my last question for you, Dr. Herrero, deals with the relative impact on Park bears of campgrounds inside versus outside the Park. Do you expect that there would be much difference in terms of bear problems if the camp were inside versus outside the Park?

DR. HERRERO: The locations being proposed are close enough to the Park that they come within the home range of Park bears. The bears do not respect the boundary lines terribly well. So a poorly managed camp outside of the Park, in terms of the potential for generating problems, I

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think could be almost as great as a -- well, it would be worse than a well managed camp within the Park from the bear point of view. From the bear point of view only I have, you know, complete faith in the full perimeter fencing as a solution along with control of workers' activities and the other factors I mentioned in keeping the problem well under control.

Outside, the Province of B.C. does not quite have the same environmental management standards as Parks Canada does, and it is my impression, and Fish and Wildlife in B.C. could correct me if I am wrong in this, that they are much more want to use the rifle as a solution to bear problems than Parks Canada is.

I know this has been the case at Quintet Coal, one of the camps that has been previously mentioned in the Northeast Coal Block because a biologist colleague of mine was hired last fall to deal with extensive black bear problems which developed there, and he reported to me in writing that he killed between eight and ten black bears merely to provide for human safety in and around the camp.

Now, I am not suggesting that that would be an analogous situation which would develop in Glacier Park, but merely to point out that the regulations in B.C. are a little different in terms of treating nuisance animals or animals made

11 to be a nuisance than they are in Parks Canada.

So I am really of two minds about the whole thing. I think really from the bear point of view only a very well managed and designed and operated camp inside might be the ideal. Outside, of course, if they would manage it to the same standards then especially to the west you do get a little bit more out of grizzly bear habitat. There still is grizzly bear habitat and grizzly bears as you go further to the west, but you start to get a little bit away from the center of action.

So from the habitat point of view you would probably get a bit of improvement by going further to the west.

With regard to the east camp and going further to the east, you are in black bear habitat with a few grizzly bears and you continue to be in black bear habitat with probably a few grizzly bears so you do not get much of a habitat change by going the distance to the east.

DR. ROSS: Which leads me to my next question for Mr. Fox, which is would you plan to construct and operate the work camps in the same fashion at either of the sites, inside or outside of the Park?

MR. FOX: I think so far as regards to where the camp is. it will be built and maintained to the same standard and operate to the same standards.

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DR. ROSS: Thank you. My next question again for Mr. Fox, Dr. Herrero suggested removing the fence in the winter from December to April. You seem to have rejected that as a solution.

MR. FOX: No, I have not rejected it as a solution. It is just another added expense you have to worry about. You have to store the fence. You can have it constructed in panels. You can have larger diameter pipes sunk in the ground and put the vertical posts or the panels in there and bolt it in place and this sort of thing. That can be done, but you know, when you are dealing with something in the order of a quarter of a mile of eight foot high chainlink fence with a barbwire top and electrification on it, it is not a small job to remove that and erect it twice annually.

It is just more money, more cost, and of course, if you are taking a fence down and erecting it twice a year, you are apt to damage it and you have got repairs, and if repairs are not made, well, you have not got the security, so you know, that is the sort of thing you will run into.

DR. ROSS: In the Flat Creek camp when we were there on our site visit yesterday, I believe, it seemed to me that the camp was essentially surrounded by some rather tall trees?

MR. FOX: That is right.

DR. ROSS: In order to provide access for snow clearance around the outside of that

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fence, would you either clear those trees or would you reduce the size of the camp inside the fence?

MR. FOX: The camp size cannot be reduced. We have put it down to the smallest scale we have. There are certain regulations you have to follow.

For instance, in terms of how far the buildings have to be apart for fire protection, you have to have a fire road around the buildings and things of that nature, so you know we have got them right to the minimum according to the law, and we have done a lot of things really. The actual camp size, and I guess this has not been explained at all, the actual camp size has not increased from what we proposed last year. What we have done, we have double-decked everything. So the actual area has not increased one square foot. That is how we have solved that problem.

DR. ROSS: But that means if you were forced to choose between, in terms of maintaining the fence and were precluded from cutting down those trees, for example, then you would essentially be forced to remove the fence for the winter.

MR. FOX: That is probably the only solution to the problem, as I see it, to get away from the snow.

DR. ROSS: Thank you.

DR. HERRERO: Could I comment?

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DR. ROSS: Please do.

DR. HERRERO: I did not really suggest that the fence should be removed. I identified it as one possibility that might be looked at. I really do not know about the engineering feasibility of that type of situation.

DR. ROSS: I understood that. It did not seem to have been raised again and I wondered why. I understand, I think, now.

Mr. O'Neill?

MR. O'NEILL: In all fairness to the operation at Quintet and the bears that were removed in Quintet, they had a bear problem in Quintet because they originally located the dump within a stone's throw of the camp. That dump has since been removed ten miles away, has been fence and there is no further bear problems, to the best of my knowledge. It was the garbage drawing the bears in.

DR. ROSS: Parks, I believe in Revelstoke you made some suggestion that you had reason to doubt the figure of $33 million of extra transportation cost. I wonder if you would care to pursue that at this time? In fact, I believe you promised to raise the issue at a later date in the hearings.

DR. LEESON: I think it was Mr. McCrory who specifically brought it up in his presentation.

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However, we also have similar concerns. For example, the timing indicated in the red book to get to the camp is a lot more than we have timed it. It is nine kilometers and at highway speeds in a pickup truck it was six minutes from Flat Creek to the turnoff down to the other one, about 13 minutes to get down through the very rough road to the Illecillewaet camp which is substantially less than what is being proposed here.

We also have our own concerns about simply doubling the overtime because it seems to us there are some costs that would not be doubled and we would recommend to the Panel to request quite a detailed breakdown of that figure to see if ---

DR. ROSS: I guess this is my way of starting to ask that, and I can see Mr. Fox is turning to his figures, so I guess he is anticipating my next question, which I guess I might just as well make. Mr. Fox, would you ---

MR. FOX: Well, first of all, I would like to question the 13 minutes. Sure you can do it in 13 minutes, I can do it in 13 minutes, you can even do it on that motorbike of yours, but you are doing 90 kilometers an hour.

These people are travelling in the equivalent of a school bus with up to 40 men in it and you are going up grade when you are going to the work site. Now, how long is it going to take you?

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It will take you what I said. That is the difference. You cannot go by what your motorbike tells you, Mr. Leeson, or what I can do in my automobile or whatever. We timed it too at 13 minutes.

Another factor that we have not brought into our figures is how long is it going to take a bus like that to get across the railway tracks. And you were all there yesterday and you saw what I did. I got out of my vehicle and I flagged you people across. That is another thing that is not in these costs and that is something that would have to be done. You can face up to 15 to 20 minutes delay there pretty well any time if trains are meeting at that point because they block that crossing. Those are not in the figures.

So those are some of the other things that have to be considered at that site.

Now, how did I arrive at this? The hourly rate for a miner is $19.71 an hour. This is straight time. To that, and this is what C.P. is going to pay for, to that I have to add 37 percent overhead that the contractor has. To that I have got to add 15 percent for supervision, and this is what I am going to be charged with. Then I have got to add an overhead figure of ten percent; then he wants a profit on that, 20 percent.

So the hourly straight time cost to me is $40.99. The union agreement under which these

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people work states that all travel time will be paid at double time. So I double the $40.99 and I get my $81.98 an hour.

Now, to work out your manhours of the people who are working there and multiple it out for the four years that we are going to be there, you are looking at $33 million. It is a simple matter of arithmetic.

Another factor in there, for every 15 minutes of travel time, they get paid 30 minutes time. So if they travel for 15 minutes, they get 30 minutes double time; if they travel 60 minutes they get an extra 30 minutes, and that is what really crunches it.

I cannot do anything about that because that is a signed agreement that the contracting people have with the unions.

If you like, I can give you a detailed statement on it.

DR. ROSS: I think you just have.

THE CHAIRMAN: George Tench, any questions?

MR. TENCH: No.

THE CHAIRMAN: Parks Canada, do you have any questions?

DR. LEESON: No, thank you.

THE CHAIRMAN: Any members of the audience that wish to raise any questions on work camps?

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We are now going to move to another issue which I believe C.P. Rail you have a couple of consultants who you mentioned earlier on today. It is not specifically listed in our agenda, but there is a couple of items that we still have to cover and now seems to be an appropriate time if you would like to do so.

MR. FOX: Thank you very much, Mr. Chairman. There is only one consultant to give a talk but he will talk on two subjects. It is Dr. Hollibaugh from MacLaren Plansearch, and the subjects are erosion to aquatic habitat and waste water treatment, and I understand it is something of a 20 minute presentation; is that right, Tim?

MR. HOLLIBAUGH: One of them is 20 minutes; the other one will be 20 minutes as well.

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(Hollibaugh)

MR. TIM HOLLIBAUGH (MacLaren Plansearch): Mr. Chairman, Panel members, ladies and gentlemen, in response to concerns expressed by Parks Canada, C.P. Rail requested MacLaren Plansearch to investigate the potential impacts of erosion on downstream aquatic environments during construction of the Beaver Valley surface route.

The terms of reference of this study were agreed upon during a meeting with Dr. Leeson in 1982. The study was to determine those habitats most susceptible to impact by material that might be eroded off the right-of-way and to recommend a program to monitor these habitats to decrease the risk of habitat degradation. This presentation summarizes the results of that study.

Basically there are two different kinds of aquatic habitats in Beaver Valley. One is a stream habitat represented by Beaver River, Connaught Creek, Stoney Creek and Mountain Creek and the other creeks crossing the right-of-way. The second is the pond the marsh habitat represented by the numerous beaver ponds found in the flats of the Beaver River floor plain.

Our study investigated both of these habitat types. Of the two, we found that the marsh and pond habitats were probably the most sensitive to potential disruption by construction on the right-of-way, both because they were adjacent to the

(Hollibaugh)

right-of-way and also because they have a decreased ability to rid themselves of sediment because of the slow flow rates of water through these areas.

The rest of this discussion will focus primarily on the marsh and beaver pond habitats, although I will make some comments on fishery resources of the Beaver River later on in the presentation.

The Beaver pond habitats in the Beaver Valley are very important for a number of reasons, some of which are summarized on this slide. They provide resting and feeding habitat in the Park for migrating water fowl and shore birds, nesting in rearing habitat for some water fowl and shore birds. They are a primary habitat for beavers and muskrats, of course. They also provide a significant hunting habitat for semi-aquatic fur bearers such as otter and mink which prey on the beavers, muskrats, birds and so on, and they are also a spring feeding habitat for bears, a breading habitat for at least four species of amphibians and they provide forging opportunities for moose.

Some of the ponds also contain significant population of fish species not found in any abundance in the Beaver River or its major tributaries.

This slide shows the area sample by MacLaren Plansearch field personnel during a fall

(Hollibaugh)

survey in 1982. The study concentrated on examining fishery resources in the Beaver River and its major tributaries, and some of the beaver ponds. Wildlife biologists determined the locations of active beaver ponds in the Beaver Valley and their relationship to streams crossing the right-of-way.

We also examined the amount of sediment transported by the various streams in the Beaver Valley, the areas where the sediment was being deposited at present and areas where the sediment derived from potential erosion on the right-of-way might be expected to be deposited.

In addition to the field studies, we determined the extent of watershed of the creeks crossing the right-of-way using topographic maps and mapped these watersheds in relationship to the resources in the Beaver Valley.

Watersheds are shown in the following slide. It can be seen that most of the watersheds of these streams crossing the right-of-way lie well above the right-of-way and that where the streams cross the right-of-way there is only a limited amount of area draining directly into the stream beds. Most of the right-of-way area would drain directly downslope from the right-of-way into habitats below the right-of-way.

In these areas, sediment derived from erosion would be spread over larger areas.

(Hollibaugh)

Sedimentation would not be concentrated, as it might be, if all the sediments were emptied into the streams crossing the right-of-way. Sedimentation may be concentrated somewhat by smaller intermittent streams crossing these areas which are not shown on this map. However, cross slop draining by ditching along the right-of-way or by benching out of cuts, as has been suggested earlier today, might cause increased sediment deposition or might cause an increased amount of the sediment to enter the streams if these ditches or whatever drained into the streams.

Beaver habitats in the Beaver Valley were mapped during an extensive field program last fall. An example of the map produced is shown in the following slide. You can see that the beaver areas were classified as to active and inactive systems. I do not know if there are any inactive ones on that slide, and the number of colonies in each area was determined by counting the number of food caches from a helicopter survey. Incidental observations on the occurrence of other wildlife were also made.

Further information was obtained, further information on organisms and animals in the Beaver Valley was obtained in discussions with Canadian Wildlife Service in the Park and by reference to unpublished manuscripts produced by

(Hollibaugh)

the Canadian Wildlife Service.

This slide shows the area roughly between the road down to the gravel pit bridge, which is kind of off the slide to the left, and Stoney Creek. Three creeks cross the right-of-way in this area: Tupper Creek, an unnamed stream on this map which is also known as Soper Creek, and Stoney Creek.

The second slide shows the area further downstream including Stoney Creek, two avalanche chutes and Surprise Creek, and the habitats downstream of these environments or the habitats downstream from here. You can see that we did not just concentrate on beaver habitats between the Beaver River and the right-of-way, the area which is expected to be impacted by the construction of the right-of-way. It included all the habitats in the Beaver Valley since these are also important in providing recruits to habitats on the other side of the Beaver River.

In all 17 areas of beaver activity were observed in the Valley. In most cases there was only one colony per area, but in some cases there were two or more colonies. Our wildlife biologist was then asked to rank the susceptibility of the areas with respect to potential impact from erosion based on his knowledge of the area and a location of the beaver systems with respect to streams

(Hollibaugh)

crossing the right-of-way. The ranking produced by the biologist is shown in this slide. As you can see, there are three areas with moderate to high susceptibility to erosion occurring on the right-of-way. These areas are located on Tupper Creek, on Soper Creek, which is referred to as the unnamed stream as unnamed stream number 3 in our report, and the avalanche paths which are referred to as unnamed streams numbers 5 and 6 in the report which we tabled with the Panel. Other habitats in the Beaver Valley were identified as having low to moderate susceptabilities or no susceptability at all.

A hydrologist involved in the study was next asked to draw profiles of the streams crossing the right-of-way and to indicate on these profiles the beaver areas and also where he might expect sediment removed from the right-of-way to be deposited. Examples of this analysis are shown on the next four slides.

The first gives a profile of Tupper Creek showing the two beaver activity areas located downstream of the right-of-way and the areas where sediment might be deposited. We have indicated areas of deposition of both course and fine sediment by the different sizes of the dots.

As you can see from looking at these slides, the slope above the activity area is

(Hollibaugh)

extremely steep and the slope changes abruptly as it reaches the Valley floor. The flat area in the Valley floor will be expected to collect any sediment being removed from the right-of-way by erosion.

(Hollibaugh)

The next slide, a profile of Stoney Creek. You see that there are no flat areas downstream of the right-of-way and that the slope where the stream crosses the right-of-way is fairly moderate. In addition there are no beaver activity areas located on Stoney Creek. This partly because of the steepness of the creek, the high grading of it, which makes it difficult for them to maintain dams and the fact that there is very forage material for them on this stream.

The profile of Stoney Creek is typical of the three major streams crossing the right-of-way, Connaught Creek, Stoney Creek and Mountain Creek. They all have a fairly high slope which is continuous all the way to the Beaver River, and the velocities at which the water crosses the flood plain would not allow finer sediment to be deposited before they reach the Beaver River.

The last two examples are the streams crossing the avalanche paths which were referred to in the report as unnamed streams number five and six. As with Tupper Creek, you can see that the slopes above the valley floor are fairly steep. Where the streams cross the right-of-way they still have a high gradient which decreases abruptly as the steams reach the valley floor. You will also notice that there is indication of debris cone in this stream by the decrease in slope relative to the high slope of Tupper Creek,

(Hollibaugh)

which does not have a debris cone. As you can see in the figures sediment will be deposited where these streams begin to flatten out and on both of these streams there are beaver areas that might be impacted by this deposition.

The final step in our analysis was to go to aerial photographs and topographic maps to try and map the areas where sediment would be deposited with respect to specific habitats. Examples of this analysis are shown in the next two slides. This slide shows the area downstream of Tupper Creek, which is off to the left over here, and Soper Creek, which is off to the left over there. As you can see most of the sediment crosses the Trans Canada highway in Tupper Creek would be deposited in the alder thickets above the beaver pond before it reached the pond. Below Soper Creek there are presently beavers working in the area right below the Trans Canada highway. Some of the sediment would probably be deposited in these areas. Finer sediment would reach the pond at the lower center of the photograph on Soper Creek and probably also this pond on Tupper Creek.

The next slide shows the area below unnamed streams number five and six and in the avalanche path and also Surprise Creek. This is an extremely complicated area with respect to

(Hollibaugh)

beaver activity, but again you can see that most of the sediment will be deposited before it reaches the ponds and the alder bushes at the margin of the ponds. However, some of the finer sediment would be expected to reach the ponds.

Sediment might be deposited in the foraging areas below Surprise Creek. Up in this area we found beavers that had pushed up into the coniferous forest and were taking down cottonwoods well above where their lodges and wintering ponds were. This situation was observed at both Surprise, Raspberry and Cedar Creek. The sediment on Surprise, Raspberry and Cedar Creek probably would not reach any of the ponds themselves.

To go back to the stream habitats, the results of our surveys of the stream habitats revealed an extremely impoverished fisheries resource. We obtained samples of three species of fish: Dolly Varden or bull trout, mountain white fish, which was the most abundant species, and slimmy sculpin. We could not find any spawning areas, however potential spawning areas were located above the gravel pit bridge and possibly in the mouth of Stoney Creek and possibly near the Mountain Creek campground bridge. We found young fish in the river indicating that there had been spawnin activity but again these were very few. A few of the

(Hollibaugh)

streams were marginal habitats for fish because of the fast flow rate of the water, the cold temperature and the high sediment loads carried by the streams from glacial flower and erosion along the tributaries.

The only significant fish resource we did find were in beaver ponds located between Cedar Creek and Surprise Creek, which contained an extremely abundant population of extremely small brook trout. We feel that these fish were overcrowded and probably underfed.

Our final task was to recommend a monitoring program capable of detecting potential problems so that mitigative and preventative measures could be implemented before the problems really developed.

The final slide indicates the kinds of monitoring we suggest. At the time that we wrote this report we do not have a specific program of measurements, frequency and what-not in mind but the kinds of things that one would expect to be doing are listed on this slide.

Streams crossing the right-of-way should be inspected on a regular basis daily or more frequently to look for changes in the colouring of the stream as it crosses the right-of-way since the colour of the water is the best reflection of sediment content available. It also gives an

(Hollibaugh)

instantaneous result, which is very important because in methods employing laboratory analyses you often wait two to three days to get the results back from the laboratory to confirm something which you can see with your eyes, and if you wait that long to take mitigative measures, you will greatly increase the impact.

Periodically, however, these evaluations should be checked against actual determinations of sediment loads in the streams, particularly in those streams influenced by glacial flower. Sediment depositions in the environments downstream should also be monitored, probably by using a survey technique that would detect lower but more constant levels of sedimentation.

The activity of the animals in the habitats below the right-of-way should also be monitored to indicate whether they are being disturbed either by sedimentation or by activities on the right-of-way. The terresterial environment should be examined periodically for sediment deposition to see if sluffing or what-not is occurring on the slopes. This will probably be evident from examination of the slopes themselves, and it would be important to keep track of how far any sedimentation is occurring -- is penetrating into the forest below the right-of-way, and by knowing this to take appropriate measures to stop that activity.

(Hollibaugh)

I have listed down here some of the kinds of mitigation measures that one could utilize. There are many more available and possibly someone more familiar with the kind of measures to control erosion on slopes like this would be more qualified to speak on the actual techniques are used, but these are some that I thought of in examining the data that we obtained.

I thank you very much and I would be happy to answer any questions the Panel or the audience might have on this particular presentation.

MacLaren Plansearch was also asked to identify potential sources of water for use in tunnel construction and to investigate the design and siting of treatment facilities for tunnel effluent in the Rogers Pass area. In the next few minutes I will present a summary of the findings in this study. Anyone seeking a more detailed discussion is referred to the report entitled "Treatment of Waste Water from Tunnel Boring Operations". I would be happy to respond to questions both on this talk and on the previous talk at the end of this presentation.

The first slide shows the general areas with which we were concerned in this report. There will be three tunnel headings operating simultaneously; one at the west portal of Rogers Pass tunnel; one at the east portal of the Rogers

(Hollibaugh)

Pass tunnel and one at the west portal of the short tunnel. Effluents from the vent shft will also have to be treated. So there will be another treatment facility located near the vent shaft construction site.

The amount of effluent that will have to be treated depends on a variety of factors and the most important of which is the groundwater flow rate. The amount of water used in the construction tunnel will also be a consideration but it is relatively minor compared to groundwater outflow.

We were asked to design a water system to supply water to the drills during tunnel construction. Water requirements for tunnel boring at 80 Imperial Gallons per minute at each tunnel portal and an average of about 30 gallons per minute at the vent shaft. Water for use in drilling at the west portal of the Rogers Pass tunnel would be obtained from the Illecillewaet River; from the Beaver River for the east portal of the Rogers Pass tunnel, and from Connaught Creek for the west portal of the short tunnel.

Water for vent shaft construction will be taken from a small stream flowing down slope near the vent shaft site or from the stream flowing down adjacent to the Trans Canada highway at the bottom of the slope. Some of the water to be used

(Hollibaugh)

vent shaft construction may be recycled from settling ponds or it may also be obtained from groundwater sources in case the streams identified are not adequate.

The amount of effluent that will have to be treated from each tunnel portal is the sum of the water which is pumped into the tunnel for use in boring operations plus groundwater which flows out of the formation being penetrated by the tunnel. Groundwater flow rates are difficult to anticipate. The estimate we used is based on general tunneling experience and is in agreement with amounts observed during the construction and subsequent operation of the Connaught Tunnel.

Groundwater flow rates average 0.1 Imperial Gallon per Minute per lineau foot of tunnel. This is based on a large number of tunnels tunnelled all over the world rather than anything specific to the Rogers Pass area. Multiplying this figure by the length of the Rogers Pass tunnel we obtained an estimate of approximately 2,000 Imperial Gallons per Minute from each portal of the tunnel. The short tunnel is, of course, shorter, and so the estimate for that tunnel is about 600 Imperial Gallons per Minute. Flow rates from the vent shaft will have to be controlled because the vent shaft is going to be sunk vertically into the ground and there is a high risk of flooding

(Hollibaugh)

if the flow rates are not controlled. Flow rates in the vent shaft will be restricted to some 80 Imperial Gallons per Minute in order for construction to proceed.

Depletion of groundwater reservoirs at the Rogers Pass tunnel will result in some decrease in the flow rates during the tunneling operation, particularly at the Rogers Pass tunnel where the boring is expected to take over two years. Because of this factor, we have estimated that flow rates probably will not exceed 1,000 Imperial Gallons per Minute during tunnel construction. Since the short tunnel will be constructed in a much shorter length of time, we have used the original estimate of 600 Imperial Gallons per Minute because we do not feel that there will be sufficient time for the groundwater reservoirs to be depleted.

Thus tunnel effluent facilities will have to have maximum capabilities for 1,000 Imperial Gallons per Minute from each end of the Rogers Pass tunnel; 600 Imperial Gallons per Minute from the short tunnel, and roughly 80 Imperial Gallons per Minute from the vent shaft. This requires settling ponds with maximum areas of 50,000 square feet for each portal of the Rogers Pass tunnel; 30,000 square feet for the west portal of the short tunnel, and 5,000 square feet for the vent shaft. The exact calculations used to derive these numbers are included in the report,

(Hollibaugh)

and I will not go through them in detail right here. They depend on the size of particles that one is trying to remove from the effluent.

As I mentioned above, the water from the tunnel will be comprised of water used in the drilling operations plus groundwater. The tunnel effluent can thus be expected to be contaminated with a number of substances. The major contaminant will be rock dust produced during the blasting operations. In addition, lube oil and grease and hydraulic fluid will drip out of the various machines operating in the tunnels and be mixed in with the groundwater.

Residual chemicals from blasting may also contaminate this water. These will be primarily nitrate and nitrite. Residual chemicals from grouting and shotcreting operations, if these are necessary, will also contaminate the water. These will be primarily calcium and hydroxide ion which will result in a high pH.

In addition, human waste and trash can be expected to enter the tunnel effluent. Treatment facilities for the short tunnel and the east portal, Rogers Pass tunnel will probably be combined as the two portals are close together. It may be possible to intercept clean groundwater flowing out of the tunnel walls in some areas, particularly if the groundwater is coming out of distinct zones or fissures. This water could then be discharged directly into a receiving body

(Hollibaugh)

without having to be treated, thus decreasing the load on the settling ponds or the water treatment facilities.

Treatment of tunnel effluent is a two-step process. First the effluent will be passed through oil separators which will be located near the tunnel portals to remove oil and grease. We have designed the oil separator to remove droplets down to 0.15 millimeters in diameter or larger at 4 degrees C. The oil separator will also remove sand and gravel from the effluent. After passing through the oil separator, the tunnel effluent will be piped down to settling ponds.

The function of the settling pond is to remove fine sediment not taken out by the oil separator. We have designed the settling ponds to remove silt particles down to .004 millimeters in diameter, 4 microns in diameter. We have also incorporated a baffle and weir system into the settling ponds so that oil not removed by the oil separators can be prevented from entering the receiving body. Trapped oil can be removed from the surface of the settling pond by a variety of means using standard oil slick control devices.

This slide shows a schematic diagram of an oil separator. They are very simple devices. There is an inlet zone where water from the tunnel enters the pond and a baffled outlet zone.

(Hollibaugh)

Oil floats to the surface of the water during its passage along the length of the separator and is prevented from leaving the separator by the baffle and weir system at the end.

An oil skimmer of one sort or another is located near the outflow of the pond and removes the accumulated oil and deposits it in a collection tank adjacent to the separator. This tank is emptied periodically and its contents disposed of in an environmentally safe manner. Sediment will also have to be removed from the pond occasionally.

We recommend that at least two ponds be constructed, oil separating ponds be constructed at each portal and operated in parallel except when one is shut down during cleaning operations. We feel that the second pond can handle the additional load for short period of time, particularly since we have a back-up system for possible oil escape by the baffle and weir system on the settling pond downstream.

The next slide shows a schematic diagram of a settling pond. It is also a very simple device. It is designed so that sinking particles reach the bottom of the pond by the time the water that they are moving with has reached the far end of the pond. Like the oil separator, the inlet is at one end and the outlet is at the other. A baffle and weir system, which is not shown in this

(Hollibaugh)

figure is associated with the outlet zone. Accumulated sediment will be removed from the pond and disposed of or new ponds will be constructed to replace sediment-filled ponds. The bottom of the ponds will be covered with shotcrete or some other sealant in order to prevent water from leaking out of the pond into the surrounding ground.

The ponds should be constructed in modules capable of handling 2,000 (sic) Imperial Gallons per Minute since the maximum flow from the tunnel is not expected to be reached until the tunnelling operation is nearly complete. Pond construction will be scheduled so that a reserve pond is available at all times to meet unexpected increases in flow rates.

The schematic diagram of the complete water supply and water treatment systems for one of the tunnel's portals is shown in this slide. As you can see, there is a supply line taking water in to the tunnel face where it is used in the drilling operations. Effluent leaving the tunnel first passes through the oil separation pond and then enters one or another of the settling pond units where the finer material is removed. The clean effluent is then discharged into an appropriate receiving body.

(Hollibaugh)

We next examined the area around each of the construction sites to look for suitable locations for settling pond construction. The sites we identified are shown in the following slides. Because of various constraints on the use of many of the sites, we met with Parks Canada to discuss the acceptability of each of these sites. The first figure shows sites considered near the east portal of the Roger Pass tunnel and the west portal of the short tunnel. Parks Canada indicated that sites 3, 7 and 8 were acceptable settling pond locations. Three is in the disturbed area which is a borrow pit, I believe for the highway here. Seven and eight are in the two pits on the other side of the Beaver River.

As can be seen on the final design plan shown on C. P. Rail's display, the ponds are to be located at the edge of Site 3. These ponds will handle effluent from both the east portal of the Rogers Pass tunnel and the west portal of the short tunnel. Sites 7 and 8 would only be needed if extremely high flow rates were encountered. Clean effluents from the settling ponds will be discharged downstream into the Beaver River.

Likewise a number of sites were identified near the west portal of the Rogers Pass tunnel. After discussion with Parks Canada Site No. 4, up here, was chosen as a settling pond site.

(Hollibaugh)

This site is located between the existing C. P. Rail mainline and the Trans Canada highway east of the west portal. Effluent from that pond will be discharged into Illecillewaet River.

We identified also two sites near the vent shaft; one adjacent to the Trans Canada highway and one above the access road to the vent shaft construction site. Parks Canada suggested locating the settling pond on the actual vent shaft construction site because neither the two sites we had initially suggested were acceptable. The settling pond location has been moved to the old C. P. rail line adjacent to the vent shaft access road, somewhere down in here. This pond is indicated again on the display in the back of the room. Pond effluent would be discharged into the stream running along the Trans Canada highway here.

Because the key to proper water treatment is anticipating problems and dealing with them before they become severe, we propose a rigorous monitoring program for the pond effluent. This program meets or exceeds the E.P.S. Standards for Government institutions such as the Parks Canada compound at Rogers Pass. The parameters we will be monitoring, the frequency with which they will be monitored, the tolerance limits of these parameters and the action to be taken if the tolerance limits are exceeded are given in the final slide, and for

(Hollibaugh)

those of you in the back of the room it is also reproduced in C.P.'s Red Book. Data will be recorded and will be available to the interested public.

This completes my presentation and I will now be glad to respond to questions from the Panel or from the audience.

THE CHAIRMAN: Panel, do we have any questions concerning this presentation?

MR. TENCH: The measures for erosion control seem to relate to a gentle flow or erosion of material from construction slopes. What will happen in the case of a construction mishap or say a slip or a landslide like the one that is existing now? What measures have you got in mind for that sort of situation?

MR. HOLLIBAUGH: For cleaning up and preventing it?

MR. TENCH: And to prevent the sediment from getting down into beaver areas?

MR. HOLLIBAUGHT: Well, it would depend on where the slide occurred. In the case of the slide which happened last May, I guess, that was cleaned up right away and was prevented from getting into the beaver pond habitat directly below the slide by the Trans Canada highway.

The other areas along the right-of-way, for instance along the avalanche chutes, it will be very difficult to clean that up and, in fact, you

(Hollibaugh)

might cause more damage by trying to clean it up than you would just by leaving it there.

Many of those streams right now experience debris flows and mud slides of one sort or another, and that is not say that one should not be worried about that, but in some cases there is not much that can be done.

THE CHAIRMAN: I believe we had a question from a member of the audience there. Did somebody want to ask a question?

MR. HERRERO: I have been curious in all this erosion control. This is probably not a question that the presentor can answer but one that Parks Canada is going to have to answer if they can. A primary factor that would influence both erosion and also landslide potential once the cuts were made would be forest fire, and I wanted to ask two questions of Parks Canada in this regard.

The first is: do they have a policy of complete fire supression in the immediate area of the construction and up slope from it, and secondly, if they have this policy, do they know enough about the fire potential to know whether they could control say a major lightning strike and a series of fires in a hot year?

The questions relates to the potential of a major fire causing a major loss of tree cover, thus the increasing water run-off and water

(Hollibaugh)

borne erosion and sedimentation.

MR. McKNIGHT: I will have to admit, Steve, I am not intimately familiar with the fire control plan for Glacier National Park. Possibly Mr. Gallacher might want to comment on that.

I would assume that the fire control would be practiced quite rigorously along the edges of the Trans Canada highway as much for reasons of concern for avalanche control as anything else.

What was your other -- the second part of your question?

DR. HERRERO: That was it. It is just that fire is such an important factor influencing with erosion and avalanching and I had not heard it mentioned either this afternoon or this evening in terms of the potential for erosion that I wondered if it had been looked at at all.

THE CHAIRMAN: Do we have any more Panel questions concerning the presentation?

MR. TENCH: It seemed to me that monitoring disturbance of animals by observing the animals seemed to me to be a rather odd way of going around the thing. Is this not sort of a rather negative way to deal with that problem?

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MR. HOLLIBAUGH: Well, in some kinds of disturbance, it is probably going where you can monitor it. For instance, sedimentation, obviously you can measure sediment content in the streams or you can simply observe mud entering the streams or being deposited in the environments. But if, for instance, operation of heavy equipment on the right-of-way adjacent to some of the habitats disturbed maybe the beavers down and they packed up and moved, well that is an impact of one sort or another.

But the only way that you would know that that was a problem is if they actually packed up and moved, and even at that, you might have a hard time establishing a cause and effect relationship with activity on the right-of-way because they do sometimes just pack up and move.

MR. TENCH: But you do not have many options if that is occurring of getting recovery?

MR. HOLLIBAUGH: No, that is true. As can be seen by the closest to which the beavers in that Valley come to the highway right now, there is one colony below where the slide was that you can sit there, I watched last spring. It was a pair with four kitts. We sat up on the guardrail watching for a whole afternoon.

There is another colony where Soper Creek crosses the ---

MR. TENCH: You are using Mr.

F-2

Fox's money again.

MR. HOLLIBAUGH: Well, we were observing. Anyway, there is another colony where Soper Creek crosses the highway which is being established in what is presently a coniferous forest. They have moved up into that area and are progressing towards the highway, so you know, they are fairly tolerant in some level of disturbance.

THE CHAIRMAN: Could I follow up on this question of standards and erosion control. I think tomorrow we are going to hear from David Walker, and I am reading his presentation now. He is suggesting a standard of so many tons per hectare per year. I am wondering whether you can translate that sort of standard into something you can monitor in what you are doing here? How easy is it to get to this sort of standard, tons per hectare per year, which I think is commonly used in conservation circles to parts per million or whatever in the water courses.

MR. HOLLIBAUGH: Monitoring concentration of sediment in the water courses and using that do derive amounts of erosion is a very difficult thing to do. The reason for that is that erosion is so much dependent on discontinuous events, rain storms and whatnot like that, that you have to be monitoring continuously in order to get a good record. You have to be there the moment it is happening. What we suggest doing

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to try to get around that is monitoring some of the downstream habitats. One can look at the area that is influenced by the streams crossing the right-of-way. If you want to you can map the area, go out and measure sediment deposition and then go backwards from a straight volume calculation to determine the amount of sediment that had come down the stream.

But actually measuring sediment in the stream, you know, I would suggest it as a backup measure for the direct observations primarily because the case may come up sometime where there is a need to establish cause and effect relationships.

THE CHAIRMAN: That also was a suggestion that came up this afternoon of a standard, perhaps ten parts per million above whatever the base line is, but I guess what you are saying is it is pretty darn hard to establish what the base line is. It depends whether there is a storm or what the flow level is?

MR. HOLLIBAUGH: Right. The sediment level in the stream before it reaches your right-of-way is going to change abruptly if there is a storm event as well as if there is a severe erosion problem below the right-of-way. Also, you would have to sort of be there on the spot. For instance, we were out there a couple of weeks ago as part of our ongoing monitoring program in these streams, measuring the sediment levels in some of the streams up there, and two avalanche areas had virtually no

F-4

sediment in the streams. The Beaver River had, I do not know, about 25 parts per million and Stoney Creek had about 40 parts per million. Last fall we measured it again at low flow season. Those levels are much lower.

THE CHAIRMAN: Thank you.

DR. ROSS: I have just been forced to go back and check the document because I was looking at some of your numbers on your slides, and I see that part of my difficulty may be in someone's inability to convert from C.P. units to metric units because there is simply an inconsistency here.

Notwithstanding that, let me proceed. I am slightly worried about the design of your settling ponds and of your oil separating units in terms of their capacity to handle the flows that may be involved. So let me proceed and I will try to make the corrections as I go.

This may be just a typo, in any case, you seem to apply first a ground rule, a rule of thumb, a rule of thumb for ground water, I guess, that indicates there will be about 150 litres per second of flow, 2,000 imperial gallons per minute, and then divide it in two because that really does not happen. I am not sure what use a rule of thumb is that is too high by a factor of two, but it seems to me that you may have the potential of having higher flows than the 75 litres per second that you are designing for.

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I note especially that the B.C. Rail tunnel, which is much shorter than the Rogers Pass tunnel and the Rogers Pass tunnel has expected higher ground water flows, but the B.C. Rail tunnel was giving about 50 litres per second.

So my first question is what is your ability to deal with a significantly higher flow of water, waste water from the tunnels?

MR. HOLLIBAUGH: One would have to increase the number in area of settling ponds.

DR. ROSS: My next question then is do you have the space to do that?

MR. HOLLIBAUGH: I believe there is more space available on the number 3 area identified, and as I mentioned during the presentation other areas across the Beaver River were discussed at a meeting with Parks Canada. Now, I subsequently learned that these have also been identified for other uses so I am not sure of the status of those areas. But something like that would have to be done.

DR. ROSS: Does that give your contractor any further problems if you get much higher flows? I assume that that could cause difficulties as well. Perhaps, Mr. Fox, you could respond to that?

MR. FOX: What those flows were, how they were developed, they were developed by the geological consultants, and they made an

F-6

assessment of expected ground water flows.

Now, how right they are going to be we will find out when we drill the tunnel. It is pretty difficult to say what you are going to hit inside a tunnel. To those were added the water necessary for drilling and so on and so forth.

So based on that, the boys have taken that information and they have designed their settling ponds accordingly.

Now, what we will probably do so far as the contractor is concerned is that we will not pay him for the expected flows. In other words, he will have to provide for that. Anything above that, we will have to pick up the tab which, of course, will mean more settling ponds and whatever.

Now, your other question about if you are unfortunate enough to hit heavy flows which you do not anticipate, it depends on how those flows occur within the tunnel itself and, for instance, you mention Northeast Coal. I happened to see that myself, and looking at it, I felt in my own mind if I had been the owner, I could have done something about it. I would not have let it go into the settling ponds like was done. To me that was a rather ridiculous situation.

They probably could not have avoided it the way they went about drilling the tunnel initially, but shortly thereafter they could have done something to save all that rock, et cetera

F-7

getting into the Wolverene River.

Now, that is beyond my jurisdiction but I would have done it differently. What I would have done in a case like they had, I certainly would have put a collector system in there and piped that good, clean water directly into the river which would not hurt anything.

DR. ROSS: So there are ways of dealing with excess flows?

MR. FOX: Oh yes. Another solution to a problem like that is you always know when you hit that because you generally have a drill ahead of you and that is how they found this. They did not go into it blindly. They knew it was there because the water was coming out at very high pressure.

You could have routed that off. That is an expensive way of doing it, but it can be done. It can be routed off. So there are various ways of dealing with that type of thing.

MR. HOLLIBAUGH: If I might interject, one other method which I have also discussed in that report that can be used to increase the efficiency of the fixed size of settling ponds that you have available is to turn to the use of --

DR. ROSS: Flocculants.

MR. HOLLIBAUGH: -- flocculants, right.

DR. ROSS: Let me then move on to the oil separation unit. I guess my concern there

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seemed to arise from the fact, if I read it carefully, and I went back to look at it two or three times, the oil separation unit seems to be designed for only 15 litres per second and divided into two sub-units, but you plan or expect to put 75 litres per second through. So to suggest -- if I understand how these things work, since their ability to separate the oil from the water depends on the flow rate, in fact, it is not designed to remove oil at that rate that you claim it is designed for because you are putting five times as much flow through.

MR. HOLLIBAUGH: You just put five oil separaters if needed.

DR. ROSS: No, but you seem to have implied throughout the report, with the one exception of the monitoring program, that you can get by with only sufficient oil separation capacity for 15 litres per second and then you will just check and see if it is working by looking for oil films.

MR. HOLLIBAUGH: The unit was designed conservatively so that it does have more capacity than what is indicated in there.

Also, for instance, as I mentioned, if you switch one off to clean out the accumulated sand and whatnot, then you are of course doubling the flow through the other one if there is only two.

DR. ROSS: But in that case you are putting 75 litres per second through something

W-9

which is technically designed to handle about 7.5 or one-tenth of the flow?

MR. HOLLIBAUGH: That is right. You have got a settling pond downstream and the system is specifically put that way to catch any of the oil which gets past it.

DR. ROSS: You raised the same question again. Do you have the space to add ten times that capacity or five times that capacity for oil separators?

MR. HOLLIBAUGH: Yes, those you do because they are quite small units. They are six feet by 25 feet.

DR. ROSS: I thought I remember reading somewhere that they were in a place where space was at a premium, but in any case.

MR. HOLLIBAUGH: They do not have to be there, they can be moved. They have to be in line somewhere between the river and the settling -- between the tunnel and the settling pond.

MR. TENCH: Is it right that the one at the west portal is a singular tank, Ken, the settling pond there was just one single settling pond?

MR. HOLLIBAUGH: No, that would be divided up also.

MR. TENCH: Divided?

MR. HOLLIBAUGH: Yes.

MR. TENCH: I see. So you have got no singulars. What I was getting to when the day

F-10

comes to clean it out, what happens, but if you have got multiple units, then it is quite obvious.

DR. ROSS: You discussed a monitoring program which includes toxicity tests for air fluents and I gather these toxicity tests are done daily; is that correct?

MR. HOLLIBAUGH: I recommended that. That is a much higher frequency than is used commonly in these kinds of programs.

DR. ROSS: What can you do if you find a problem?

MR. HOLLIBAUGH: There are measures indicated on the table that you can do.

DR. ROSS: I thought they were a little bit vague in terms of what one does. If there is a problem, you expect it to be from one of those ones which is flagged in here rather than something dissolved in the water?

MR. HOLLIBAUGH: Probably. The probable source of the problem would be possibly changes in PH or from grading operations, things like that, or possibly a spill of one sort or another into the water which should not happen because, you know, you separate.

DR. ROSS: One of the other things you monitor is the water temperature clearly to prevent freezing. What puzzled me was that your solution to freezing aside from insulating the pipes which presumably you can only do so often boils

F-11

down to increasing the flow and increasing the flow, as I commented earlier, reduces the effectiveness, and presumably you are going to have freezing in the middle of the winter -- that is a normal expectation -- that is also the lowest sediment content in the rivers and so if you increase the flow and reduce their effectiveness then you will presumably be increasing the suspended load into the rivers at a time when its sediment load is very low in the first place. Is that likely to lead to problems?

MR. HOLLIBAUGH: It is possible. However, the temperature problem usually does not occur because your ground water is coming out at a temperature, you know, six to eight degrees commonly, and experience with for instance B.C. Ore Line where they operated at temperatures at 35 degrees below zero, they did not have any problem with freezing anywhere in any other ponds.

DR. ROSS: I hope I am just going to correct a comment you made during the presentation. You suggested that, and I quote, "one or the other" of the settling pond would be used. Surely they would all be used in parallel?

MR. HOLLIBAUGH: Well, unless you have got one turned off to clean it, yes.

DR. ROSS: Yes, except for cleaning, but in order to handle that capacity again, it is the same problem, you must flow through all of them?

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MR. HOLLIBAUGH: Yes. Not in series but in parallel.

DR. ROSS: Yes. Lastly, you made a comment I believe in one of the documents dealing with the sediment load in the rivers. This may not be such an important issue any more but I wanted to make sure I understood it.

It seems to me that the fish, in particular, and other species in the river are accustomed to a certain seasonal variation in sediment loads, that is about this time of year there are very high sediment loads, high flows and that does not cause any great difficulties for them, but for most of the season, effectively from October, November through to the increased flows in the spring there are very low sediment loads and so it seems to me that certainly by comparison with what occurs to now, it seems to me that looking as you did in some of the analyses at the annual sediment carried is really not a measure of impact on fish or species in the river.

MR. HOLLIBAUGH: No, I addressed that in there by looking at the dilution rates and the relative concentration of sediments both in the winter.

DR. ROSS: But what does that does that means that all of the problem really arises in the winter at low sediment?

MR. HOLLIBAUGH: Yes, that would be

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the most critical time because during the summers, as you mentioned, the sediment loads are much higher and if using the EPS guidelines for discharges of the kinds of things which will come out of the settling ponds during the summer, it is conceivable that you could discharge the clean, which is to say, oil skimmed absolute direcly into the river and still be within the background plus ten.

DR. ROSS: No, I agree. Finally, I guess for Mr. Fox, in your red book you indicated that the water from the settling ponds would be recycled for drilling needs. Do you plan to do this anywhere other than at the vent shaft?

MR. FOX: No, I do not think we would do it at portals at all.

DR. ROSS: I did not think so and I just was not sure when I read that. Thank you.

THE CHAIRMAN: Any further questions concerning this presentation? Thank you for your presentation. I would just like to provide an opportunity for any last questions at this time.

I guess I have one to Parks and this goes back to the work camps. It seemed to me in the presentation that you gave tonight that the prime issue for you was one of policy of having work camps in the Park, and I was wondering what the difference was between the situation now with what you are seeing with these work camps and the situation that we were looking at last year in terms of policy

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implications of putting a work camp into the Park? We did not hear too much about policy last year and I wondered why this concern suddenly appeared at this time?

DR. LEESON: It is a concern that was precipitated by your meeting last year. We had not thought that policy would be as much of an issue amongst the people who commented to us as it was. So it became a point of concern at that point. We asked C.P. to investigate the camps a lot more and answer a lot of questions, and the more we asked and the more was answered, the more concern became until a month ago it was determined, boy, this is a bad deal. We cannot agree to have camps in the Park of the sort that is being talked about.

THE CHAIRMAN: Yes, because of the size of the things because there are camps, well, the Trans Canada Highway, for example, there are small work camps, I believe, in the Park. Maybe I am wrong in that one, but there has been in this Park, in Glacier, for example, there have been small camps. It is the size of the thing that is bothering you, is it?

DR. LEESON: Well, that certainly compounds the problem, the size of it, yes.

THE CHAIRMAN: You are saying it is a reaction to public concern that your hearings expressed to you?

DR. LEESON: In part and in part

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to the reality of all the things that are necessary as we find out more about them.

THE CHAIRMAN: Fair enough. One other question, Mr. Fox, for you. We heard a rather crisp presentation from you and what it would cost you to put these work camps outside the Park. I wonder whether you could give us a suitable crisp figure on what it would cost you if you had to stay within the 200 foot right-of-way that you had asked for originally from CTC? If you need time to work on that, that is fine.

MR. FOX: Well, I will give you a top of my head figure and I probably will not be too far off. Fifty million dollars.

THE CHAIRMAN: Extra. Thank you.

DR. ROSS: I wonder if you could -- is that just a guesstimate or is that based on ---

MR. FOX: That is a guesstimate, Dr. Ross, but I will wage it is not too far off when you are looking at retaining walls at $100 a square foot.

THE CHAIRMAN: The other thing is that I would guess that in some of those areas you would not, under any circumstances, be able to stay within the 200 feet, for example, in the slides areas where your design proposals are for two to one slopes.

MR. FOX: Just an absolute impossibility.

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THE CHAIRMAN: Are there any further questions at this time from anybody? If not, I would like to thank you for coming along this evening and we will be reconvening tomorrow morning and we will be going into revegetation and reclamation at that time.

Thank you.

---Whereupon the hearing adjourned at 10:00 p.m.